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DEPARTMENTS

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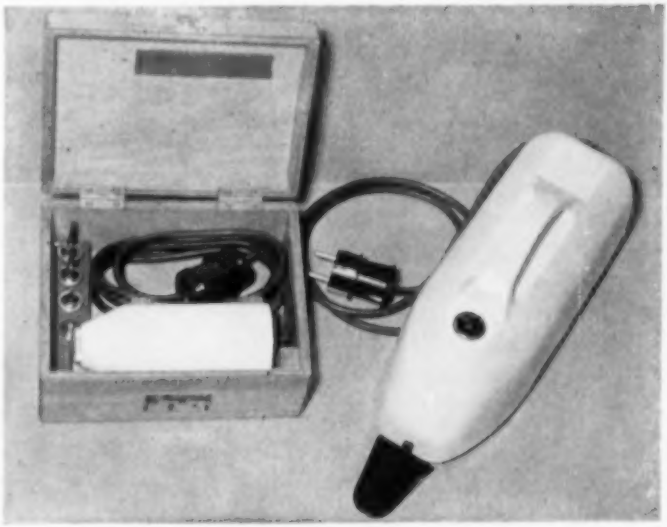

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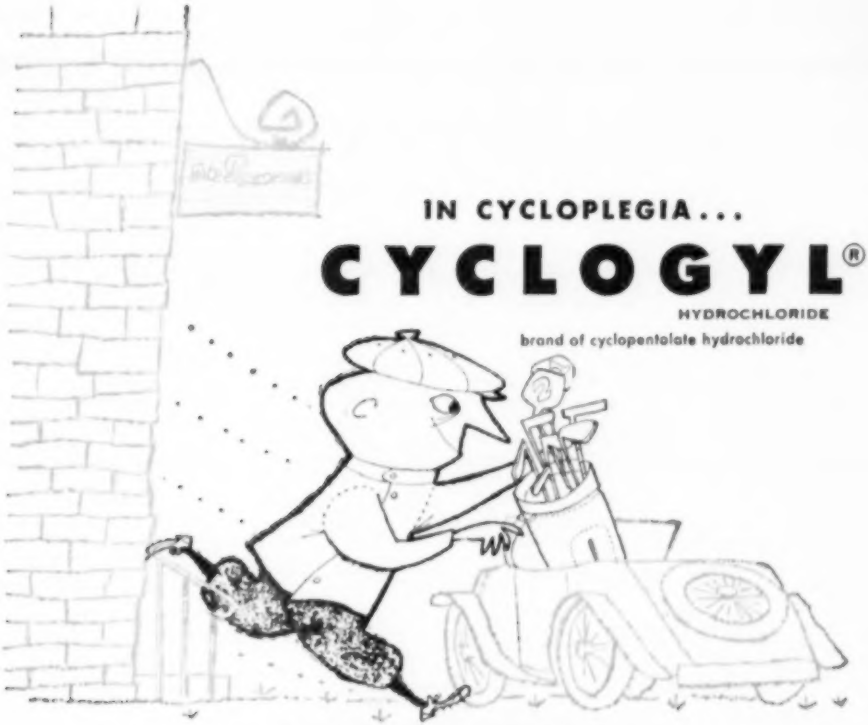

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1. Gordon, D. M., and Ehrenberg, M. H.: Am. J. Ophth. 38:831 (Dec.) 1954.

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+ or − .50	2.0 mm.	4.0 mm.
+ or − .75	1.3 mm.	2.6 mm.
+ or − 1.00	1.0 mm.	2.0 mm.
+ or − 1.25	.8 mm.	1.6 mm.
+ or − 1.50	.7 mm.	1.3 mm.
+ or − 1.75 to + or − 3.00	.5 mm.	1.0 mm.
above + or − 3.00	.5 mm.	.5 mm.

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 39 APRIL, 1955 NUMBER 4, PART I

EXPERIMENTAL APPROACH TO THE PATHOGENESIS OF RETROLENTAL FIBROPLASIA*

II. THE INFLUENCE OF THE DEVELOPMENTAL MATURITY ON OXYGEN-INDUCED CHANGES IN THE MOUSE EYE.

LARS J. GYLLENSTEN, M.D., AND BO E. HELLSTRÖM, M.D.
Stockholm, Sweden

INTRODUCTION

There seems to be little doubt that high environmental oxygen plays an important role in the etiology of retrolental fibroplasia in premature children. Clinical investigations have shown almost unanimously that premature children exposed to high concentrations of oxygen are more likely to develop the disease than premature children administered lower concentrations of oxygen or none at all.[1-13]

It is not impossible, however, that other factors may also contribute to the development of the disease. The oxygen-induced changes in the eyes in animal experiments in various species[14-21] are indistinguishable from the early pathologic alterations in retrolental fibroplasia but the possibility remains that these retinal vascular changes represent an unspecific response to several noxious agents. Furthermore, this experimentally produced vascular reaction seems to be reversible, or at least does not develop further into stages corresponding to the more advanced disease in premature infants who have retrolental membrane formation.

It is a well-established fact that immaturity of the organism is a predisposing factor in the disease in children. Although occasional cases have been reported in full-term infants, it is a general rule that the incidence and severity of the disease are higher in the lower weight groups.[22]

In most animal experiments, newborn litters of different species have been used with various results, and it is probable that the different pattern of retinal vascularization and the different degree of retinal vascular maturity at birth are factors of prime importance in this respect. Furthermore, the outgrowth of retinal vessels with advancing age follows its own specific pattern and rate in each species.[23, 24]

In previous reports dealing with animal experiments the importance of this different vascular maturity to the production of experimental disease has as a rule not been analyzed. The statement has merely been made that it has not been possible to reproduce the induced eye abnormalities of the newborn in the adult animal under the same experimental condition. One exception is the report by Ashton, *et al.* (1954),[20] in which kittens up to 22 days of age and over were used. The influence of age was studied merely concerning the degree of vaso-obliteration

* From the Histological Department of Karolinska Institutet (head: Prof. G. Häggqvist, M.D.) and the Pediatric Clinic, Karolinska Institutet (head: Prof. A. Wallgren, M.D.). These studies were aided by grants from the Swedish National Medical Research Council.

of the retinal vessels with the animals kept in oxygen. This degree was found to be in inverse proportion to the maturity of the vessels.

It nevertheless seems important to study this relationship more closely with regard to the vasoproliferative phase also, in order to observe the duration of the susceptibility of the eye in relation to its developmental maturity. The fact that the characteristic early changes in retrolental fibroplasia occur in the vessels of the nerve-fiber layer means that the degree and extension of vascularization of this layer is of central interest. In mice, this vascularization takes part entirely after birth[24] and the mouse is thus an appropriate experimental animal from this point of view.

Oxygen-induced changes in the eyes in newborn mice have also been produced previously.[14–18] In our experience with exposure of the animals in almost 100-percent oxygen, there is an inhibition of the outgrowth of vessels in the nerve-fiber layer, while the animals are still in the high oxygen concentration. This corresponds to the first obliterative phase in Ashton's experiments with newborn kittens. The second vasoproliferative phase, with the excessive overgrowth of the vessels and budding into the vitreous body, occurs when the animals are transferred to normal atmosphere.

When the newborn mice are exposed for five days in oxygen, followed by a stay in air for 10 days, a typical pathologic alteration of the eye is found in nearly all surviving animals on the 15th day, as described later on. The consistency of these findings implies a suitable basis for the comparison of incidence and patterns of eye changes in older animals treated in the same way.

Materials and Methods

Inbred black mice (stock C 57 BL/6, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine) were used. This stock has a low frequency of spontaneous eye abnormalities. Albino mice, constituting about half the material in this group, were also used in the experiments with exposure of newborn mice to concentrated oxygen. No differences as regards mortality were found between the two kinds of animals. The mothers were fed ad libitum on a standard mixture of dry milk, yeast, oats, wheat, rye, corn, and bread, with vitamins and minerals added, and were also given water ad libitum.

Exposure to concentrated oxygen occurred in airtight, 27-liter gas chambers with the gas streaming through each container at a flow of about 0.5 l. per minute. The flow was controlled at least twice a day, as was the oxygen concentration, checked by a Beckman electromagnetic oxygen analyzer. The concentration of oxygen in the cages was 98 to 100 percent, relative humidity 80 to 90 percent, and temperature 23 ± 1°C. The cages were furnished with an airtight cuff at the opening, which allowed the animals to be fed and handled and the mothers to be taken out and put into the chambers without any change of the atmosphere in the cage. Thus, a really continuous oxygen exposure was possible.

Each litter of young mice exposed to oxygen had its own litter of control animals, born on the same day. The control litter was put into a similar cage, perfused with air at the same flow, temperature, and humidity.

The adult animals did not stand exposure to concentrated oxygen for more than about four days, when most of them died with pulmonary edema, hemorrhages and/or infections. Because of this intolerance, the mothers were interchanged between oxygen and control animals regularly every day or every second day. The changing of the mothers, plus the fact that they suffered during the stay in oxygen, is the main explanation of the high mortality among the young, found both in control and oxygen groups, as contrasted to the very low mortality in the animals under natural breeding conditions.

Three groups of animals were used, each consisting of about 100 to 150 young mice

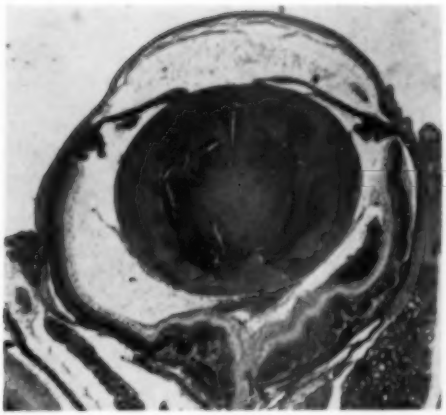

Fig. 1 (Gyllensten and Hellström). Exposure of newborn mouse to concentrated oxygen for five days, followed by stay in air for 10 days. Irregular proliferation of the retina with hyperplasia of the nerve-fiber layer. The changes are mostly concentrated to the neighborhood of the disc. Hemorrhages in the vitreous body. (×30.)

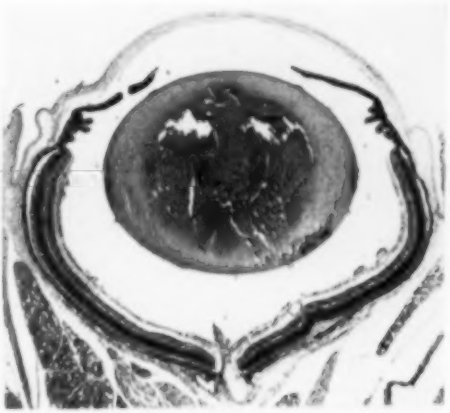

Fig. 2 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Vascular proliferations from the nerve-fiber layer with budding into the vitreous body also in the periphery of the retina. Less advanced changes than in Figure 1. (×30.)

exposed to oxygen. The total number of control animals was about 150.

1. *Newborn* mice (less than 16 hours of age) were exposed to concentrated oxygen continuously for five days, after which they were rapidly transferred to normal air. After one to two, five, or 10 days' stay in air, the animals were killed and prepared. The technique used in this group is the same as described by Gyllensten and Hellström (1954).

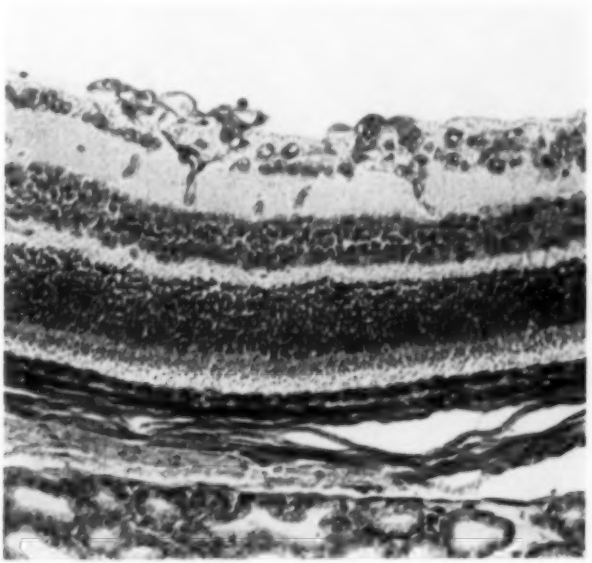

Fig. 3 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Vascular proliferations in the nerve-fiber layer with capillary tufts budding into the vitreous body. (×200.)

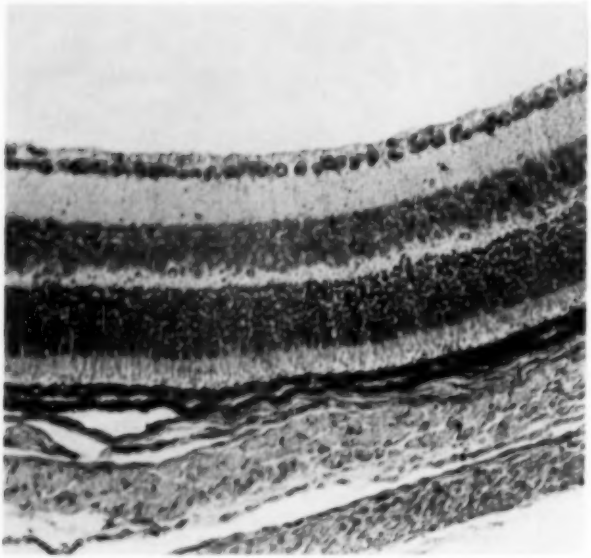

Fig. 4 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 3. (×200.)

Part of this material was included in a previous publication.[15]

2. *Five-day-old* mice were subjected to the same treatment as the newborn mice mentioned in the preceding paragraph.

3. Young mice, *10 days* of age, were treated in similar manner.

After being weighed, the mice were killed with 0.5 ml. 20-percent urethane intraperitoneally. The head was stripped free from skin and the middle part of the head with

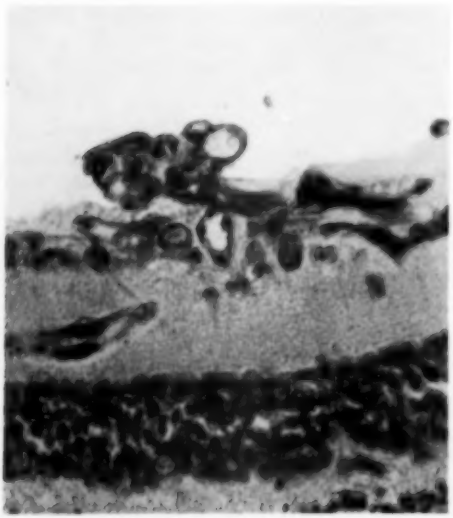

Fig. 5 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Capillary tuft from the nerve-fiber layer budding into the vitreous body. (×400.)

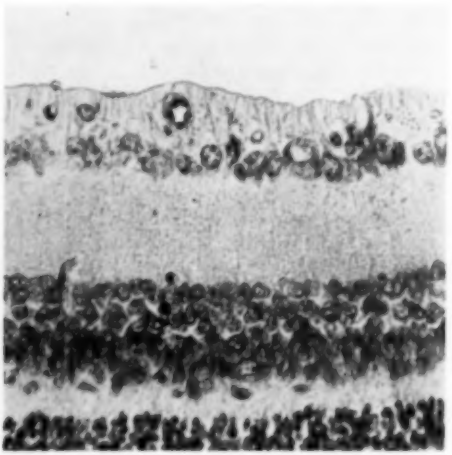

Fig. 6 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 5. (×400.)

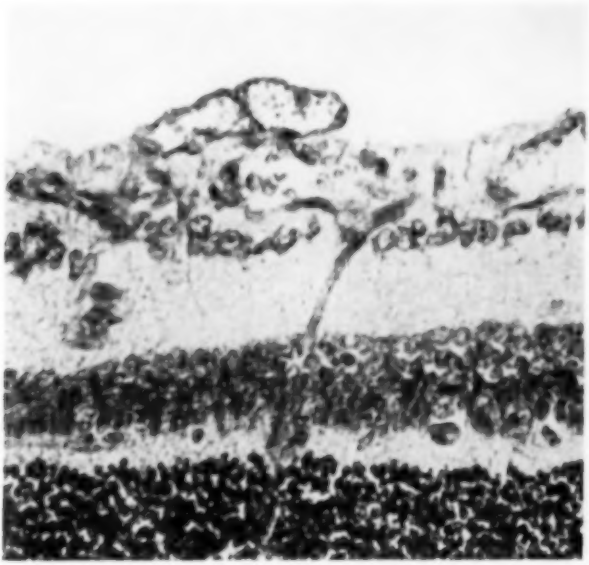

Fig. 7 (Gyllensten and Hellstrom). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Dilated vessels in nerve-fiber layer with capillaries budding into the vitreous body. (×400.)

the eyes in situ was fixed in Susa mixture (trichloracetic acid, formol, mercuric chloride, and acetic acid) for one to two days. After decalcination in formic acid and sodium formiate in low vacuum,[28] the preparation was embedded in paraffin, sectioned in series, five-micron thick sections, and every ninth section was stained in iron alum, hematoxylin, and fuchsin picric acid (Hansen).

No injections of the vessels were done, because of the drawbacks of this technique, which does not permit a histologic examination of the specimen, and because this method gives no information in the case of incomplete filling of the vessels; further, the completeness of the filling is also often difficult to judge.[29]

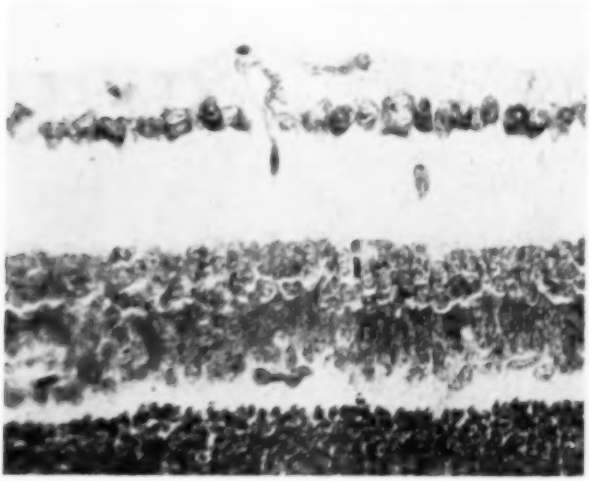

Fig. 8 (Gyllensten and Hellstrom). Normal retina. Corresponding control to the animal of Figure 7. (×400.)

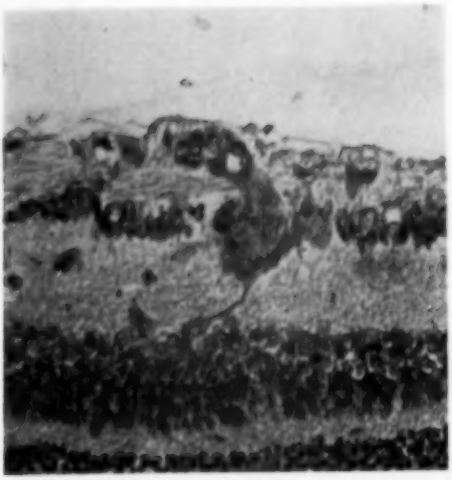

Fig. 9 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Syncytial angioblastic nodule growing from a vessel in the nerve-fiber layer through the ganglion-cell layer and the inner plexiform layer to the inner nuclear layer. (×400.)

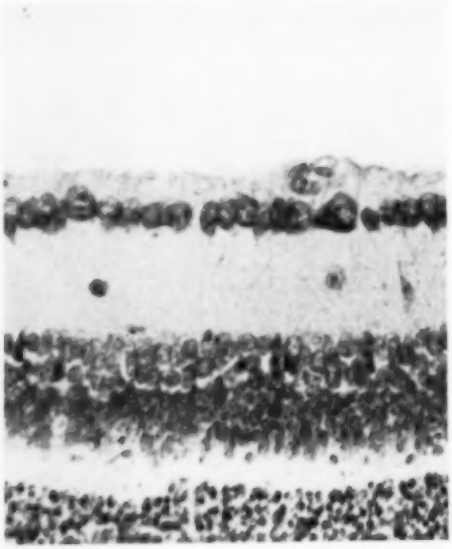

Fig. 10 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 9. (×400.)

Results

A. Normal material

In our preliminary experiments, previously reported, albino mice were used, and the first impression was that the incidence of spontaneous ocular lesions in this strain was low. However, a morphologic study of more

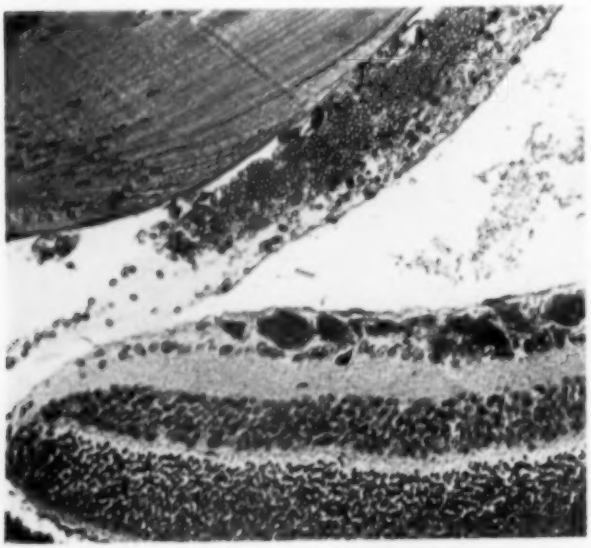

Fig. 11 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Congestion of vessels in the nerve-fiber layer in the anterior part of the retina close to ora serrata. Hemorrhage in the vitreous body at the posterior surface of the lens. (×200.)

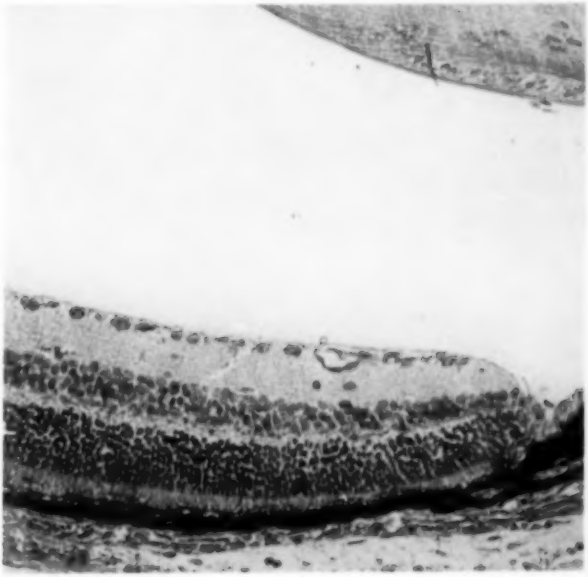

Fig. 12 (Gyllensten and Hellström). Normal retina close to ora serrata. Corresponding control to the animal of Figure 11. (×200.)

grown-up animals revealed an incidence of spontaneous atrophy of the outer nuclear layers with rods and cones as high as in one third of the animals. This "rodless retina," first described by Keeler (1924),[27] has been extensively studied by Karli,[28] both from the morphologic and the physiopathologic point of view, and its occurrence is attributed to a recessive gene.

Although this atrophy did not seem to influence the early reaction of the vessels in the present experiments, the strain was

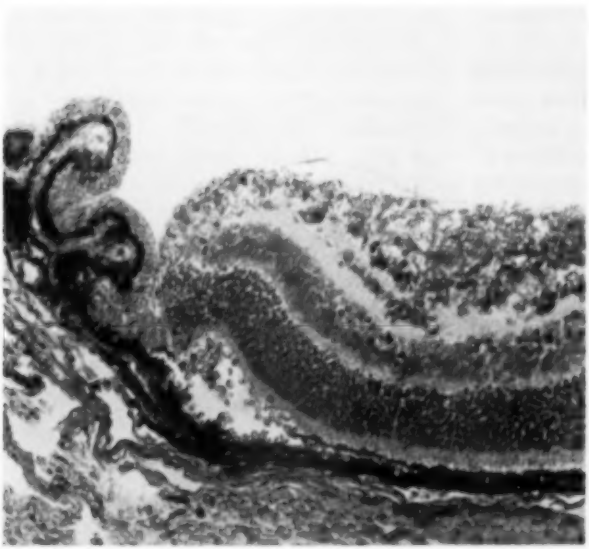

Fig. 13 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Hemorrhage in the nerve-fiber layer close to ora serrata. (×200.)

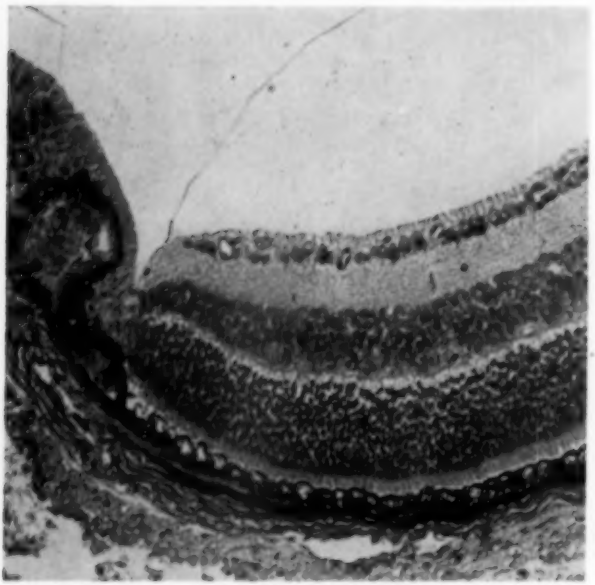

Fig. 14 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 13. (×200.)

no longer used. All the following experiments were instead performed with black mice of the strain already mentioned. No atrophy of the type in question was observed in this strain.

Under normal conditions there are no vessels in the retina in *newborn* mice. The hyaloid vessels are persistent, and there is a distinct tunica vasculosa lentis.

At five days after birth, the hyaloid vessels and especially the tunica vasculosa lentis show a marked regression with only irregular lumenified remnants. The vascularization of the retina has started, with vessels growing peripherally from the disc in the nerve-fiber layer and reaching about halfway between the disc and the ora serrata.

At *10 days* after birth, the hyaloid vessels have regressed further and are most often to be seen only as small remnants near the disc. The retinal vessels reach close to the ora serrata, where they end in a small circular limiting vein. Capillaries have grown down from the nerve-fiber layer to the outer layers of the retina, reaching the outer plexiform layer and, sometimes, the outer nuclear layer.

Minor abnormalities were also encountered with the black strain, and these have been tabulated (table 1). Spontaneous hemorrhages occurred in a few cases, but were of minor extent. Spontaneous budding of the nerve-fiber vessels was found in two cases. This was also of minor degree, but was noteworthy with regard to the importance of this finding among the experimental animals.

Retinal folds were frequently found (approximately one fourth of the eyes), most of them single and located in the outer nuclear layer. The possibility of a technical artefact producing these folds cannot be excluded. In one animal a slight atrophy was found with the inner nuclear layer and outer plexiform layer partly reduced.

TABLE 1

EYE CHANGES IN YOUNG MICE, CONTROL ANIMALS, BLACK STRAIN

Age in days	5–25
Hemorrhages in the vitreous body	3.0%
Hemorrhages in nerve-fiber layer	1.0%
Vascular hypertrophy and/or buddings into the vitreous body	2.0%
Atrophic changes of the retina	1.0%
Irregularities of the retinal layers and/or folds	24.0%
Number of animals	89

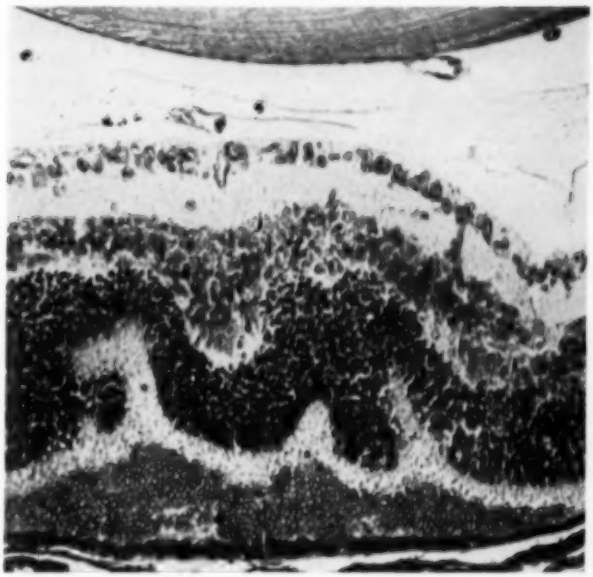

Fig. 15 (Gyllensten and Hellström). Exposure of five-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Irregularities of the nuclear layers, hemorrhage between the layer of rods and cones and the pigment epithelium. (×200.)

B. Experimental material

The survival rates of the animals in the different groups are difficult to compare as the groups are not exactly the same. The rough death rates of the young, exposed to oxygen, were 49, 41, and 61 percent for animals exposed to oxygen as newborn, at five days of age, and at 10 days, respectively. The death rates of the corresponding control groups amounted to approximately 37, 33, and 23 percent, respectively.

Fig. 16 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 15. (×200.)

The high mortality among the newborn animals is to a great extent due to cannibalism. Despite the lessening of the cannibalism when the young grew older, the death rates tended to increase again as regards the 10-day-old animals, when exposed to oxygen. This was due to a decreased resistance of the older animals to the toxic concentration of oxygen.

The young, exposed to oxygen, tended to show a smaller gain in weight than the controls. The weight of the heaviest oxygen-treated animals in every group was greater than the mean weight of the corresponding control animals, and a comparison of eye changes in animals of the same weight gave the same results as when all animals were compared. Thus, no obvious correlation of eye changes and weight was found, despite the fact that Michaelson, *et al.* (1954),[26] noted that underdeveloped mice show a tendency

TABLE 2

EYE CHANGES IN YOUNG MICE EXPOSED TO HIGH CONCENTRATION OF OXYGEN FOR FIVE DAYS AT DIFFERENT AGES AFTER BIRTH, FOLLOWED BY RAPID TRANSFER TO AND STAY IN NORMAL AIR

Age when exposed to concentrated oxygen (days after birth)	0		5		10	
Subsequent stay in air (days)	1–5	6–10	1–5	6–10	1–5	6–10
Hemorrhages (mostly in vitreous body and/or retina)	40%	93%	50%	33%	17%	24%
Vascular hypertrophy and/or buddings into the vitreous	0	77%	53%	22%	7%	7%
Atrophic changes of the retina	0	0	22%	33%	65%	100%
Irregularities of the retinal layers and/or folds	0	77%	38%	63%	65%	100%
Number of animals	15	30	32	27	46	29

to retardation of the vascularization of the retina.

The eye changes of newborn mice after five days' continuous stay in oxygen and subsequent stay in normal air have been described in full elsewhere.[15] During the first few days after the rapid transfer to normal air there are frequent hemorrhages in the vitreous body from dilated and tortuous hyaloid vessels. Later on there is an irregular new formation of vessels in the nonvascular nerve-fiber layer.

These vessels show a marked tendency to become hyperplastic with capillary buddings into the more or less fibrous organized vitreous body and with bleeding into the retina and into the vitreous body. Later on the retina often becomes irregular with thickening of the nerve-fiber layer and the inner nuclear layer, intermixing of the nuclear layers, and small sharp folds.

These changes are mostly concentrated to the neighborhood of the disc from which the retinal vessels grow (fig. 1). The frequency of the changes is shown in Table 2.

In animals exposed to concentrated oxygen at five and 10 days after birth, when the vascular system of the eyes is more developed, similar, though far less advanced and less frequent, changes occurred as in the young animals (table 2 and fig. 2).

The vascular proliferations (figs. 2 to 10) were not concentrated in the neighborhood of the disc but were found with about the same frequency in more peripheral segments (figs. 11 to 14). A gradual decrease of the frequency of the hemorrhages and the vasoproliferative changes occurred as the animals grew older when exposed to oxygen. The hemorrhages were more often located in the retina (mostly in the nerve-fiber layer [figs. 13 and 14] or between the rods and cones and the pigment epithelium [figs. 15 and 16]) than in the vitreous body.

A special and characteristic atrophy or degeneration of the retina was also found, most frequently in the oldest animals. In these atrophic cases there was a reduction or a disappearance of the outer plexiform layer with fusion of the outer nuclear layer with a more or less reduced inner nuclear layer (figs. 17 to 20). Besides, there was a reduction of the ganglion cells and, consequently, also of the nerve-fiber layer. The atrophic changes were nearly always combined with irregularities of the retina, especially of the nuclear layers, with intermixing of the nuclear layers, and, occasionally, small sharp retinal folds.

Discussion

The changes in the eyes of young mice exposed to concentrated oxygen followed by exposure to normal air, described in the

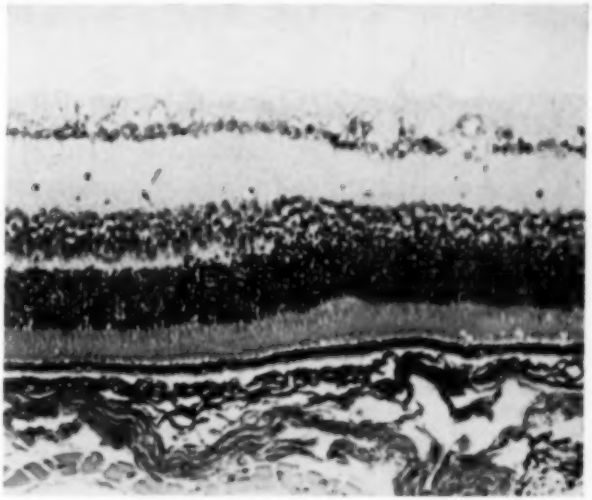

Fig. 17 (Gyllensten and Hellström). Exposure of 10-day-old mouse to concentrated oxygen for five days, followed by stay in air for 10 days. Part of the retina is atrophic with disappearance of the outer plexiform layer, fusion of the nuclear layers, reduction of the inner nuclear layer and of the ganglion-cell layer. (×200.)

present and previous papers,[14, 15] are similar to the early changes of retrolental fibroplasia of human beings as regards the hemorrhages in the retina and the vasoproliferation with capillary tufts budding from the nerve-fiber layer into the vitreous body. In our experiments these changes were observed only exceptionally during continuous exposure to oxygen. The changes appeared after a rapid transfer to air and stay in air for some days. This made it necessary to use a gas chamber, which permitted handling of the animals without any lowering of the oxygen concentration.

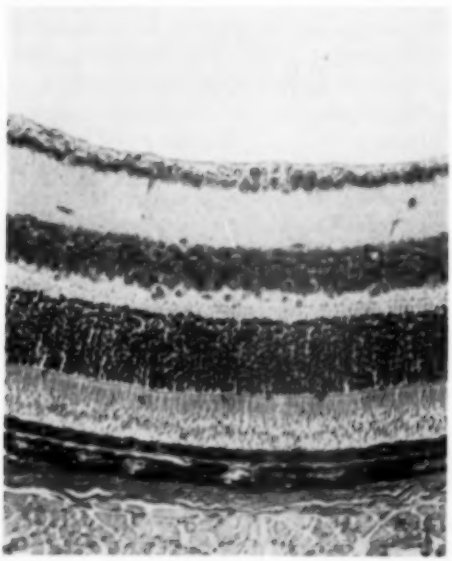

Fig. 18 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 17. (×200.)

We never observed any thromboses in our sections, as reported by Ashton, *et al.*,[20] with vaso-injections of India ink. According to Bellman (1954),[26] no injection technique guarantees a complete contrast filling of the blood vessel net, and it seems very difficult to be sure that incomplete filling of the vessels depends on thromboses and not on technical difficulties. During the stay in oxygen, we found a retardation of the outgrowth of new capillaries.

Our present experiments seem to provide further evidence of the pathogenetic relation of the oxygen-induced eye changes of mice and human retrolental fibroplasia. As in human beings, there is a positive correlation between the immaturity of the eye and the severity and frequency of the oxygen-induced changes.

In older animals, the profuse bleeding from the hyaloid vessels, which are still

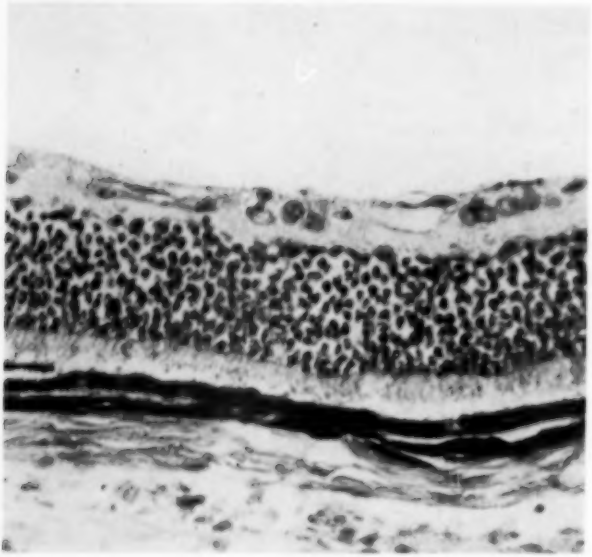

Fig. 19 (Gyllensten and Hellström). Exposure of 10-day-old mouse to concentrated oxygen for five days, followed by stay in air for five days. Atrophy of the retina with disappearance of the outer plexiform layer, fusion of the nuclear layers, reduction of the inner nuclear layer and of the ganglion cell layer. (×400.)

present in newborn mice but not in viable human prematures, tends to diminish, and the changes are more concentrated to the retina, thus being more like the changes of early human retrolental fibroplasia. In older mice, which developmentally are closer to viable human prematures, the retinal changes are shifted from the neighborhood of the disc to the periphery of the retina also, where the vessels are apparently in a sensitive developmental stage. This means another similarity to human retrolental fibroplasia.

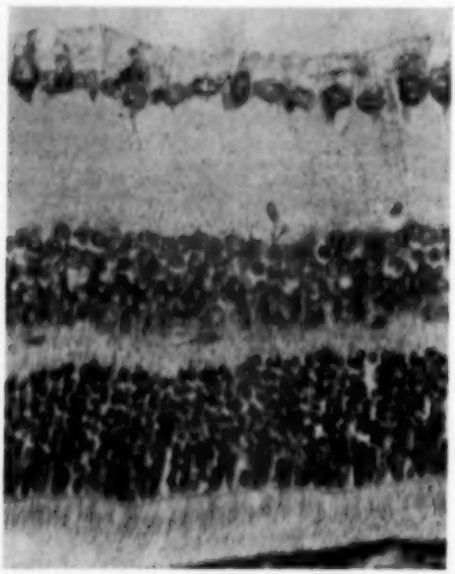

Fig. 20 (Gyllensten and Hellström). Normal retina. Corresponding control to the animal of Figure 19. (×400.)

Despite the fact that the oxygen-induced changes in mice, as described by us[15] and by Ashton, *et al.*,[20] and Patz, *et al.*,[16] show great similarities to the early stages of human retrolental fibroplasia, it must be pointed out that there is no complete identity as regards the histologic findings. No one has ever produced experimentally the final cicatricial stage of retrolental fibroplasia, seen in human cases. Thus, caution must be observed in drawing conclusions from animal experiments relating to the mechanism producing the disease.

Summary

1. Newborn mice and mice at the age of five and 10 days, respectively, were exposed to 98 to 100-percent oxygen for five days, after which they were rapidly transferred to

normal air, and prepared one to 10 days later.

2. Hemorrhages in the eye (mostly in the nerve-fiber layer and vitreous body), irregular proliferations of the nerve-fiber vessels with capillary tufts budding into the vitreous body, and irregularities of the retinal layers were found in all groups of mice.

3. In newborn mice the retinal changes were mostly concentrated to the neighborhood of the optic disc; in older ones they reached more anterior parts of the retina also. As regards site, the retinal changes thus roughly paralleled the developmental stage of the nerve-fiber layer vessels when the exposure to oxygen occurred.

4. In mice exposed to concentrated oxygen at an earlier age, the ocular hemorrhages and the irregular vasoproliferation were more conspicuous than in mice exposed to oxygen at an older age. On the other hand, the older animals tended to show more retinal irregularities and foldings than the younger ones, and an increasing frequency of a characteristic retinal atrophy of the ganglionic layer, the inner nuclear layer, and the outer plexiform layer was observed.

5. The findings are discussed with regard to the pathogenesis of human retrolental fibroplasia.

Solnavägen 1 (60).

Acknowledgement

We should like to thank Mrs. G. Fredricson and Miss S. Ronnemalm for valuable technical assistance.

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VOGT-KOYANAGI SYNDROME*

Precipitated by lens extraction: Report of a case

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Introduction

The Vogt-Koyanagi syndrome, which consists of severe bilateral uveitis associated with alopecia, dysacousia, poliosis, and vitiligo, has been considered to be not related to trauma or surgery in the cases thus far reported. Likewise, there has remained much confusion as to whether or not the pathologic process of the uveitis of the Vogt-Koyanagi syndrome and of the uveitis of sympathetic ophthalmia are similar or identical.

Several comprehensive reviews of the literature on the Vogt-Koyanagi syndrome have been made. Those available to me were by Parker,[1] Carrasquillo,[2] Hague,[3] and Rosen.[4]

Parker's statement, as early as 1940, that the marked similarity of the symptoms in all the reported cases and the lack of their response to treatment suggests the possibility of the existence of a definite clinical entity independent of syphilis and tuberculosis, the causation of which is unknown and for which no specific treatment is available, is as true today as it was 13 years ago.

In 1942, Carrasquillo[2] stated that he thought a neuropathic factor of sympathetic activity was operative in the production of the Vogt-Koyanagi syndrome and commented that the manner of activation of this factor is still unknown.

Hague[3] advanced the theory that a lesion in the suprachiasmic region could account for all the manifestations of this syndrome. He also pointed out that the syndrome has always been initiated by an upper respiratory infection, which he believed to be part of an encephalitis; severe emotional trauma; or a tumor pressing on the hypothalamus.

Rosen[4] pointed out the experiment of Riehm[5] in which foreign protein injected into the eyes of a rabbit produced sensitizing reactions in the opposite eye. This occurred only when the rabbit was pigmented and not when it was an albino.

A detailed report of a case exhibiting all

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of the component parts of the Vogt-Koyanagi syndrome is presented. An attempt will then be made to explain in a logical manner the component parts of this syndrome, whether it occurs as a spontaneous infection or as a surgically precipitated inflammation.

Case report

First admission

History: C. R. *(69-697)*, a 55-year-old Filipino male, was admitted October 11, 1950, with the complaint, "I cannot see anymore with my right eye and my left eye is getting weaker." The onset of his visual difficulties began six months prior to admission in the form of "a play of colors in my right eye when I'm out in the light and dimming of vision which has gotten steadily worse."

Past history revealed that he was treated in this hospital in 1939 for approximately 10 days, at this time a diagnosis of diabetes was made. However, the record of that admission is not available.

In September, 1944, he was admitted for paresthesia of the right side of the body and weakness of the extremities of the right side. Spinal fluid examination revealed no increase of globulin, normal colloidal gold series, and negative Kahn. Visual acuity was recorded by the ophthalmologist as 20/30−1, O.D., and 20/40 −1, O.S. Perimetric examination showed concentric contraction of the left field, and it was the ophthalmologist's opinion that there was an early optic atrophy on the left.

Other pertinent past history was the fact that he had malaria while in the Coast Guard, the last attack being in 1949, appendectomy in 1927, and tonsillectomy in 1938.

System review elicited the complaint of mild tinnitus intermittently for 10 to 15 years, urinary frequency every 45 minutes to one hour during the day, and nocturia four to five times. He denied ever having any venereal disease. He admitted to mild, burning type of pain of feet and legs every night, especially when working.

Physical examination. Pertinent physical findings were: Blood pressure, 156 mm. Hg, systolic, and 92 mm. Hg, diastolic. Pulse, 92. Temperature, 98.6°F. Weight, 196 lb.

Eye examination. Right eye: Tension, with the McLean tonometer, 28 mm. Hg (top normal 40 mm. Hg). Visual acuity limited to light projection and distinction of red and blue lights. There were no findings in the anterior chamber or iris to suggest previous iritis. The lens capsule was very much thinned. The entire contents of the lens capsule gave a sparkling, shimmering, silvery reflex. The lens cortex was liquefied. All nuclear layers were broken up by white flakes and plaques. No structure posterior to the lens could be seen.

Left eye: Tension 35 mm. Hg (McLean). Uncorrected vision 20/20−1, correctible to 20/15−1. There were a few persistent pupillary membrane remnants. The lens showed early diffuse opacification of the cortex, and the outer face of the adult nucleus gave a washboard appearance. There were tiny sparkling opacities scattered through all the nuclear layers, more prominent in the outer nuclei than the inner and more dense inferiorly than superiorly. No vitreous floaters were noted. "Copper-wire" effect of the inferior arteries of the retina was the extent of sclerosis.

He heard a spoken voice at 30 feet in each ear and a whispered voice at 15 feet in each ear. There was plus-one pitting edema of the ankles and lower legs and a scar over the left lower leg due to previous trauma. The remainder of the physical findings were normal.

Laboratory data. See Table 1.

Chest X ray. On March 21, 1951: "The lungs are essentially clear. The mediastinal shadow is normal."

Hospital course and treatment. An extracapsular lens extraction was done on the right eye October 16, 1950, with unintentional rupture of the capsule. His postoperative course was uneventful until October 28th when he developed a head cold and

TABLE 1

LABORATORY DATA: FIRST ADMISSION

Date	Material	Findings
10-11-50	Urine	Acid, S.G. 1.022, Albumen and sugar negative
10-11-50	Blood	4 quantitative Kahn units
10-23-50	Blood	Standard Kahn doubtful
10-30-50	Blood	Standard Kahn doubtful
11-17-50	Blood	Leukocytes 5,500—49% neutrophils, 45% lymphocytes, and 6% eosinophils
12-11-50	Blood	Standard Kahn negative, leukocytes 5,700—neutrophils 62%, lymphocytes 32%, monocytes 4%, and eosinophils 2%
3-12-51	Blood	Sedimentation rate 66 mm. per hour
3-22-51	Spinal fluid	Cells 2, globulin 2+, protein 82 mgm. %, Kahn negative, opening pressure 230 and closing pressure 190
3-29-51	Spinal fluid	Cells 3, globulin 2+, protein 80 mg. %, Kahn negative
3-29-51	Nasal scrapings	No leprosy bacilli
5- 8-51	Spinal fluid	Cells 0, globulin 1+, protein 50 mg. %
5-20-51	Blood	Serum calcium 10.7 mg. %
		X-rays: First admission
11- 7-50	Chest	Photofluorograph normal
1-13-51	Sinuses	Some increased density about the antrum and ethmoid margins. No fluid level
3-12-51	Chest	Large plate—Lungs clear, mediastinal shadow normal

burning epiphora, O.D. The right eye became more injected and he did not count fingers well. The retinal reflex gradually darkened and glaucoma developed, O.D., so that tension was 60 mm. Hg (McLean) on November 16, 1950. Temporary relief was obtained by keratocentesis and daily opening with the spatula under aseptic technique.

By December 8, 1950, stippled deposits were seen on the posterior corneal surface, O.S., but the patient had no photophobia and no scleral or episcleral injection, O.S. He was started on sodium salicylate (20 gr. every six hours); one-percent atropine solution, O.U., every three hours; and intravenous typhoid regimen. On December 11th, extreme hyperesthesia of the scalp appeared. On December 14th, definite posterior synechias were noted, O.S. Subconjunctival injection of cortone was begun, O.U., on December 15th. On December 20th, intravenous sodium iodide and sodium salicylate therapy were started.

Severe emotional trauma occurred when he received word that his two older children had been apprehended by the police and the younger child had been taken to a juvenile home on December 24, 1950. Therefore, he left the hospital, ignoring the prognosis for his eyes.

On December 28th, 0.1 cc. of iris pigment was injected intradermally into the left upper arm to determine sensitivity to uveal pigment. On December 30th, he complained of marked tinnitus and decreased auditory acuity. Examination revealed the canals to be clear. The drums were intact. The eustachian canals were patent as was demonstrated by release of the drums with Valsalva's maneuver. An audiogram of that date is shown in Figure 1.

Tension could no longer be controlled by keratocentesis so combined iridencleisis and intracapsular lens extraction was done on the left eye on January 22, 1951—the iridencleisis to combat glaucoma and the lens extraction because the lens was markedly opaque by this time and because a phacotoxic reaction and/or phacoanaphylactica was suspected.

At the first postoperative change of dressing, January 24th, there was good drainage along the iridencleisis. The larger cellular deposits had nearly cleared from the posterior corneal surface by the 14th postoperative day.

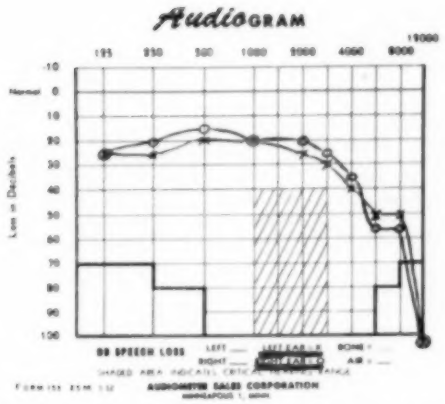

Fig. 1 (Swartz). Audiogram on December 30, 1950, at the time of onset of dysacousia.

On February 19th he developed a large, horizontal, bandlike ulcer across the center of the left cornea. This was treated with penicillin drops and occlusion but responded poorly. Biomicroscopy revealed numerous blood vessels invading the old keratocentesis site of the left cornea by February 28th but the iridencleisis was still functioning well. At this time aureomycin, orally and topically, was substituted for penicillin in an attempt to heal the left keratitis.

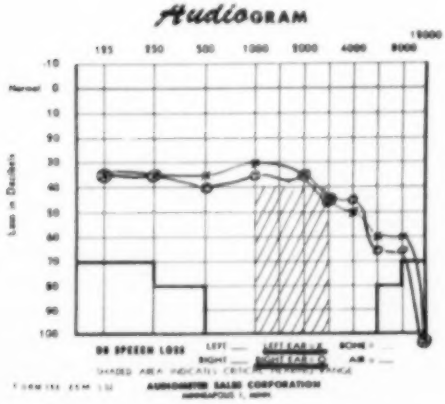

Fig. 2 (Swartz). Audiogram on March 10, 1951, at which time a more severe fluctuation of tinnitus, vertigo, and dysacousia occurred.

On March 2nd, further emotional trauma was added by his domestic situation, and he again left the hospital for four days. After his return on March 6th, vision began to decrease again due to gradual clouding of the vitreous. On March 10th, he had an exacerbation of the vertigo, tinnitus, hearing loss, and scalp paresthesia. By March 16th, he was quite disoriented, with a mixed euphoria and depression type of psychosis.

Lumbar puncture on March 23rd showed the fluid changes previously reported under laboratory studies (table 1). Subsequent spinal-fluid changes and nasal-scrapings results are also given in the laboratory data.

His course fluctuated but gradually went downhill, and on May 12, 1951, itching of the entire skin surface began. About May 20th he developed multiple furunculosis and soon thereafter, alopecia areata. When the hair had come back by July 19, 1951, it was white, giving him the poliosis appearance seen in Figure 3. He was discharged July 19th as the eyes were quiet and it was felt that further interference was not justified until several months of quiescence had passed.

Second admission

When he was readmitted October 8, 1951, he stated he had noticed no change in his eyes or his general condition during the interim.

Physical examination revealed the following:

The right eye was able to project light and distinguish white, red, and blue light. A full-thickness pannus infiltrated the cornea for a distance of three mm. from the upper limbus. Along the entire temporal margin of the cornea, a dense, homogenous white tissue invaded all layers for two mm., then tapered off just to the posterior layers. By gonioscopy this same white membrane could be seen extending back over the pectinate ligament and then reversed out over the anterior surface of the iris. The corneal tension was not enough to raise the McLean indicator needle.

TABLE 2

LABORATORY DATA: SECOND ADMISSION

Date	Material	Findings
10- 9-51	Urine	Acid, S.G. 1.014, Albumen and sugar negative
10- 9-51	Blood	Standard Kahn negative; Leukocytes 7,400, neutrophils 56%, lymphocytes 38%, monocytes 3%, eosinophils 3%; hemoglobin 15.0 gm. %
10-10-51	Spinal fluid	Cells 5, globulin 0–1+, protein 38 mg. %, colloidal gold 0012100000
11- 1-51	Blood	Leukocytes 4,600; neutrophils 50%, lymphocytes 48%, monocytes 1%, eosinophils 1%; total eosinophils 160 per cm.
11-20-51	Spinal fluid	Cells 4, globulin not increased, protein 30 mg. %, colloidal gold negative, Kahn negative
11-30-51	Skull X-rays	Sella turcica within normal limits of contour and size. Slight deviation of what appears to be a calcified falx to the right

The anterior chamber was deep. Several pigment deposits were seen on the posterior surface of the cornea in its inferior quarter. All crypt structure of the iris was lost, and the iris had a fluffy, dusty appearance. The pupillary frill was absent, and the pupillary margin of the lesser circle sent wedge-shaped projections into the cyclitic membrane from the 10- to 2-o'clock position. The pupillary membrane was quite dense.

The left eye was unable to perceive light. A corneal pannus extended downward from the superior limbus in a solid sheet, three to four mm. into the cornea. Long wedges extended varying distances across the cornea from this sheet and contained vascular loops. This pannus involved all layers of the cornea. The anterior chamber was deep except superiorly where the iris lay up against the cornea. The iris changes, synechias, and cyclitic membrane were similar to those in the right eye. Tension was 0.

Large areas of vitiligo were noted on both legs, on the buttocks, shoulders, and forearms (figs. 4 and 5). The scalp showed marked spotty poliosis.

The remainder of the general findings were unchanged from those noted on his previous admission.

Laboratory and X-ray data. See Table 2.

Hospital course and treatment. On October 15, 1951, a piece of the pupillary membrane was excised. When the eye was dressed on the first postoperative day, an anterior chamber was present with no hyphema. There was marked macular and striate keratitis. Twenty-one hours postoperatively he developed severe, massive urticaria of the abdomen, hands, legs, and chest. He was started on Pyribenzamine (100 mg., three times daily) and barbiturates were discontinued. The urticaria subsided within 24 hours and did not recur until November 3, 1951.

The eye continued to improve until November 3rd (the 18th postoperative day) when he again developed the massive urticaria of his legs. The only medications which he was receiving at this time that might explain the urticaria were scopolamine topically and terramycin orally. Pyribenzamine and diatrine were used without effect to relieve the urticaria, and aqueous adrenalin hypodermically gave very little relief.

In an effort to control the massive urticaria, oral terramycin and topical scopolamine were discontinued on November 12, 1951. The urticaria appeared after he retired in the evening and disappeared during wakeful hours despite any treatment that was attempted.

A thorough study of diet by elimination, and contact factors such as wool, silk, feathers, and kapok failed to give any clue as to what was causing the allergic manifestations. This urticarial reaction subsided gradually in the course of approximately one month. The pupil of the right eye contracted when scopolamine was discontinued, and a plastic membrane reformed across the pupil.

At the time of discharge on December 21, 1951, this patient could see bright light with

FIG. 3

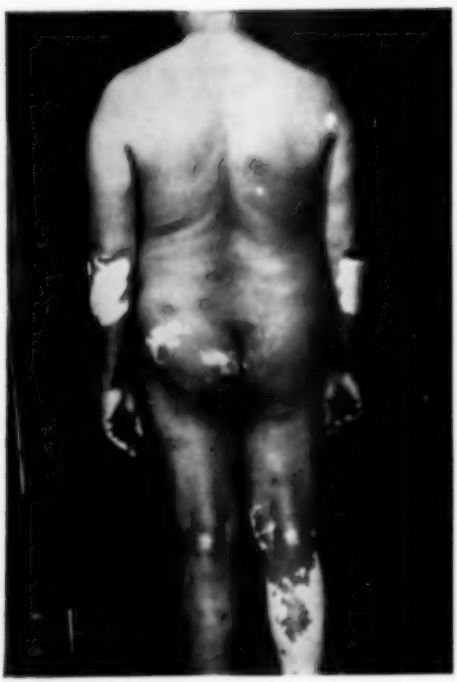

FIG. 4

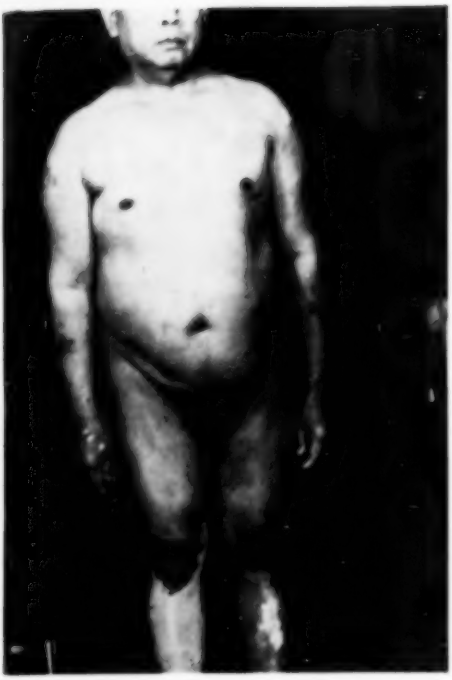

FIG. 5

Figs. 3, 4, and 5 (Swartz). Vogt-Koyanagi syndrome. (Fig. 3) Shows the pronounced poliosis of the scalp in this case. (Figs. 4 and 5) Show the vitiligo present in this case.

the right eye, which helped him some as a guide, and he could still distinguish red, blue, and white light with the right eye. He had no light perception in the left eye.

The following information was received from the patient by letter dated June 18, 1953, in response to direct questions: "The gray spots in my hair have remained the same. The white spots on my skin have remained the same. My hearing is better than it was when I left the hospital. It is about the same as it was when I was first admitted to the hospital. None of my eyelashes are white. My vision is getting worse. I am totally blind now, where as before I could see light in my right eye."

Pathology

The biopsy block made from tissue taken from the left upper arm, January 11, 1951, was labeled S-51-73. A small piece of iris which was obtained by biopsy at the time of iridencleisis of the left eye on January 22nd was labeled S-51-141. Both of these slides have been examined carefully and the microscopic findings described by three different pathologists. Their reports are as follows:

The first report is by Dr. T. L. Perrin, at the U. S. Public Health Service Hospital, Seattle:

"S-51-73. There are small focal well-circumscribed accumulations of lymphocytes in the dermis. The pigment has been phagocytosed by cells mostly within the areas of lymphocytic infiltration and to a lesser extent in immediately adjacent surrounding areas. Very little, if any, free pigment is seen. A moderate number of cells, which somewhat resemble epithelioid cells, are scattered among the lymphocytes and there is some apparent capillary proliferation. An occasional small vascular channel shows slight fibroblastic proliferation in its wall but no essential endothelial reaction. At least two multinucleated giant cells are seen, with 10 to 20 nuclei evenly distributed through the cytoplasm. At no place is there a suggestion of necrosis, but focally a few collagen bands appear slightly thickened. No neutrophils, plasmocytes, or eosinophils are encountered. A few ducts and sweat glands within the area show no reaction. Diagnosis: Chronic focal inflammation, skin, site of injection of uveal pigment.

"S-51-141. The sections exhibit a small piece of highly vascular, rather loose fibrous tissue in which there are many cells filled with brown granular pigment. The surface cells at one margin are largely leukocytes and a rare eosinophil. Some of the small vessel walls appear thickened. A few cells have somewhat the configuration of epithelioid cells but there are no giant cells. Diagnosis: Chronic iritis. Comment: The histopathology does not suggest sympathetic ophthalmitis."

The second report is by Dr. Michael J. Hogan[6] of the Francis I. Proctor Foundation for Research in Ophthalmology, University of California Medical Center, San Francisco:

"S-51-73. The specimen is a portion of skin which is covered by normal epithelium. The superficial cutis contains hair follicles, sweat and sebaceous glands, and a moderate amount of uveal pigment which is scattered, not phagocytized, and shows no inflammation. Beneath this are islands of pigment which are surrounded by mononuclear phagocytes and chronic inflammatory cells. Most of the pigment which is present appears to have been phagocytized by reticulo-endothelial cells. There is no evidence of necrosis or destruction of the pigment. According to our experience this would be considered a positive uveal pigment test.

"S-51-141. The specimen is a portion of iris which was removed at iridectomy. It is somewhat folded upon itself. At the base the epithelial layers appear to have degenerated. The stroma is more heavily pigmented than I would expect; however, this is probably a racial characteristic. There are scattered chronic inflammatory cells in the iris stroma which show some evidence of secondary degeneration as a result of long-standing inflammation. In the region of the

sphincter muscle there are small perivascular accumulations of chronic inflammatory cells but no specific granulation tissue can be made out in any of the areas of this biopsy specimen. In the region of the dilator muscle there is some fibrinoid degeneration of the tissues just anterior to this structure.

"Comment: One cannot determine from the biopsy specimen nor from the uveal pigment test in the skin what the original diagnosis may have been. The clinical picture observed in this patient suggests two possible diagnoses: (1) sympathetic ophthalmia and (2) Vogt-Koyanagi syndrome.

"Many of the findings in both of these diseases are similar. It is well known that cutaneous and meningeal symptoms may occur in patients with sympathetic ophthalmia. I have examined microscopic sections of three separate eyes enucleated at the time the patient was suffering from Vogt-Koyanagi disease. All three of these specimens were received from Japanese ophthalmologists. All the three specimens showed exactly the same changes, namely, the typical findings of sympathetic ophthalmia with massive infiltration of epithelioid cells in the choroid and ciliary body. The iris did not show the specific inflammatory changes in many of the eyes. The similarity of the clinical findings and histologic picture in many patients with Vogt-Koyanagi disease and sympathetic ophthalmia suggests that they may be the same condition with different entry by the infectious agent."

The third report is by Dr. J. S. Friedenwald[7] of the Wilmer Institute, Johns Hopkins Hospital, Baltimore, Maryland:

"The section of skin shows a typically positive reaction to uveal pigment skin test. The section of iris shows only slight inflammatory reaction inadequate to permit one to make a definitive diagnosis."

From these reports I feel it is safe to assume that the pathologic findings in the nontrauma-precipitated Vogt-Koyanagi syndrome and the trauma-precipitated sympathetic ophthalmia are certainly similar enough to make differentiation quite difficult. It is realized that the iris biopsy does not add much to the picture since the primary site of the typical microscopic picture of sympathetic ophthalmia is located in the choroid and ciliary body.

It was extremely interesting to me to note in Dr. Hogan's pathologic report that in the region of the sphincter muscle, there are small perivascular accumulations of chronic inflammatory cells. This would tend to bear out Schreck's[8] findings of sympathetic ophthalmia caused by a Rickettsialike organism passing in its progress by way of the perineural and perivascular spaces. Schreck concluded that the exciting agent of sympathetic ophthalmia seemed to be related to the Rickettsia group of organisms and that the pathologic process consisted of a specific migrating periangiitis and perineuritis.

As Dr. Adler[9] has pointed out in his editorial, Schreck's conclusion is not entirely founded in that he had no control injections from nonsympathetic cases. I should also like to point out that, in addition to nonsympathetic controls, the use of neutralization studies, with acute and convalescent serum neutralization from the donor in each instance, would be required, particularly in investigating virus by continuous passage. I mention this to point out that we have no proof that the organism which Schreck[8] demonstrated was actually from the human donor material and not an organism already in the chicken eye which may have been excited into pathogenicity by the insult of injecting noninfected foreign material into the eye.

Rationale of treatment of the case reported

The medical treatment carried out during the first hospitalization of this patient is summarized in Table 3. I was apprehensive as to the prognosis in this case from the minute the anterior capsule tore during the extraction of the lens of the right eye on October 16, 1950. This was because it was realized

TABLE 3

TREATMENT: FIRST HOSPITAL COURSE

I. Sodium salicylate: Gr. 20 t.i.d. 10-29-50 to 12- 9-50
Gr. 30 q.6 h. 12- 9-50 to 12-29-50
Gr. 20 q.i.d. 1-11-51 to 2- 7-51
II. Aspirin: Gr. 20 q.i.d. 3-11-51 to 3-17-51
III. Sodium iodide: Gm. 1.0 and sodium salicylate: gm. 3.0 (i.v.) q.d. for 3-day periods: 12-20-50 to 3-11-51
IV. 0.25% scopolamine topical cycloplegia: 10-23-50 to 11-30-50
2- 6-51 go 4- 7-51
V. Atropine sulfate 1.0 percent: Drops 2, O.D., q.3h. 12- 9-50 to 1-15-51
Drops 2, O.S., q.3h. 12-14-50 to 1-21-51
Drops 2, O.U., q.3h. 1-30-51 to 2- 6-51
VI. Aureomycin, oral: 2-23-51 to 2-27-51
Aureomycin, topical: 10-29-50 to 1-13-51 and 2-23-51 to 4-8-51
Streptomycin, I.M.: Gm. 0.5 b.i.d. 3-6-51 to 3-10-51
VII. Penicillin, I.M.: 300,000 units q.d. 11-19-50 to 11-30-50
Penicillin, topical: One day preoperatively, every operation, and three days postoperatively, and 2-19-51 to 2-23-51
VIII. Cortone, topical: 5.0 mg./cc., drops 2, O.U., q.3h. 12-18-50 to 1-15-51
Cortone, subconjunctival: 0.2 cc. daily 12-15-50 to 12-18-50
IX. I.V. typhoid 3 days per week: 12-9-50 (15 million) to 12-18-50
1-14-51 to 2-9-51 (gradually increasing to 225 million)
X. Pilocarpine 1.0 percent: Drops 2, O.D., q.4h. 12-7-50 to 12-9-50
XI. Pyribenzene: 50 mg. t.i.d. 10-31-50 to 1- 1-50
1- 5-51 to 2-15-51
XII. Ascorbic acid 50 mg. and rutin 60 mg. t.i.d.: 1-24-51 to 3-11-51

that the lens was a hypermature one.

Courtney[10] described a clinical entity in 1942 in which a definite endophthalmitis resulted from absorption of lens matter and remarked that such an inflammation is more prone to occur spontaneously in the second eye of an individual who has had a rupture, operative or traumatic, of the lens capsule of the other eye, with consequent absorption of lens cortex. He pointed out that it could not definitely be stated whether the inflammation in the second eye is the result of spontaneous rupture of the capsule or whether the autolyzed lens matter passes through the capsule as through a semipermeable membrane.

Of the seven cases which Courtney reported, a rupture could be made out clinically in only one, and when this case was examined microscopically, no rupture of the lens capsule could be found.

The characteristics of endophthalmitis phacoanaphylactica are enumerated by Verhoeff[11] as follows:

1. Invasion of the lens by polymorphonuclear leukocytes and mononuclear phagocytes.

2. The presence of giant cells and polymorphonuclear cells about the lens fragments, in the iris, and in the pupillary membrane which often forms.

3. The disposition of conglomerate precipitates on Descemet's membrane, with, sometimes, proliferation of a syncytial connective tissue in the anterior chamber in which various types of inflammatory cells can be found, including giant cells, polymorphonuclear cells, and occasional eosinophils (an almost verbatim description of the gonioscopic findings in the right eye of the case reported here on his second hospitalization).

4. The presence of cyclitic membrane in protracted cases.

5. A relatively unaffected posterior segment.

The pathognomonic finding is the combination of polymorphonuclear leukocytes, and macrophages and giant cells phagocytizing lens material.

Irvine and Irvine[12] reported 11 cases of injured eyes with inflammation believed to be related to the lens, and I should like to quote the pathologic anatomy described for their Case 1:

"There is marked perilimbal, lymphocytic, and plasmocytic inflammation. Small blood

vessels within the epithelium and beneath it at the limbus at one side suggest an early degenerative pannus. Blood vessels are seen in the stroma peripherally. An organized fibrotic syncytium lines the endothelium, chamber angles, anterior surface of the iris, verging on the pupil, thus filling the anterior chamber except for an oval space centrally, measuring five mm. transversely."

(Note again the almost exact repetition of the description of these structures at the time of the second hospitalization in the case herein presented.)

Irvine and Irvine[13] point out that there may be no particular characteristics to differentiate lens-induced uveitis from other types, and if the uveitis persists, paracentesis and irrigation of the anterior chamber are indicated if the zonular-capsular barrier is intact or the vitreous is in such a state that irrigation would not be hazardous.

They also point out that in case of injury or operation on one eye, incidental and unrelated cataract in the opposite eye may subsequently lead to reaction to lens material and be confused with sympathetic ophthalmia. The two conditions can also occur coincidentally, as was demonstrated in their Case 20.

At the time of development of my patient's uveitis in the right eye about October 28, 1950, a virus etiology was given priority due to the associated head cold, along with the pain and epiphora of the eye, as well as the fact that he had been exposed to temperature change and draft.

When posterior synechias were beginning to form in the left eye on December 14, 1950, I again became concerned about the possibility of a phacoanaphylactic response, especially since it was noted that the cataract in the left eye was increasing noticeably in density at this time. This is the reason that the lens of the left eye was extracted (and iridencleisis performed) on January 22, 1951. It was hoped that removal of the antigenic substance from the left eye might halt the progression of uveitis in the right eye.

Discussion

The outstanding features of this case are:

1. A severe uveitis following spilling of products of hypermature cataract.

2. A relentlessly progressive uveitis in the unoperated eye.

3. Glaucoma in both eyes after the uveitis had progressed in each.

4. Paresthesias, psychosis, and reduction of hearing, all of which possibly could have been due to an encephalitis.

5. Alopecia of the areata type, with subsequent poliosis and vitiligo.

6. A severe generalized urticaria, the antigenic etiology of which could neither be explained nor ascertained. The urticaria presented a rhythm which could not be explained and which did not reveal any dramatic change with any of the present drugs specific for this condition—the antihistaminics, barbiturates, and adrenalin.

What, then, are the possibilities as to the sequence of events in this case?

Was this a case in which a specific Rikettsialike organism was introduced into the right eye?

Was this a case in which a uveitis was set up by the introduction of a virus organism, with subsequent pigment sensitivity responsible for a sympathetic-ophthalmia-like disease, with the same organism causing the encephalitis?

Or did the establishment of a pigment sensitivity cause the encephalitis?

Or could it be that the whole process was initiated on the basis of a phacotoxic reaction to hypermature lens products which in turn produced pigment sensitivity, which in turn went on to produce the encephalitis?

I was at first tempted to accept Hague's[3] hypothesis that the dysacousia results merely from an extension of an inflammatory process along Gudden's tract or possibly along the fibers from Gudden's commissure to the medial geniculate bodies described by Clark[14] and his associates. However, when one considers the fact that perilymph, according to Eggston and Wolf,[15] of the vestibular ap-

paratus and the cochlear apparatus is believed to be confluent with cerebrospinal fluid, it seems much more likely to me that the dysacousia is explained merely as an extension of a virus infection from the brain or meninges.

Bakay,[16a] in his studies of the blood-brain barrier with radioactive phosphorus, reported that a greater amount of P^{32} was found in the pituitary gland, infundibulum, and tuber cinereum than in any other parts of the human brain in autopsy specimens from six hours to three weeks after a single intravenous injection of this material. Other hypothalamic regions did not differ much from the central nervous system.

According to Wislocki and King,[16b] acid dyes injected intravenously, whether readily diffusible or colloidal, stain the hypophysis, both the epithelial and neural parts, but do not deposit in the intermediate lobe. They found a large accumulation of dye granules in the posterior lobe and explained it by the great vascularity of the area and the "open texture of the neurohypophysis." Bakay[16a] cites the following from Finley:[16c]

"In monkeys and, presumably, in man, the nucleus supraopticus is supplied by the richest capillary bed of any nucleus or group of nerve cells within the central nervous system."

According to Wislocki and Leduc,[17] the neurohypophysis, pineal body, area posterema, intercolumnar tubercle, and supraoptic crest are small areas of the brain which, except for the fact that they stain vitally, show little similarity to the other components of the hematoencephalic barrier, that is, the choroid plexuses and the meninges.

"These areas resemble one another, however, in that besides staining vitally, *they are vascularized by numerous sinusoidal blood vessels* which are surrounded by conspicuous *perivascular sheaths*. Both the pattern of the vessels and their connective tissue sheaths distinguish them sharply from the general cerebral capillaries."

We certainly cannot dismiss entirely the possibility that the dysacousia is on an allergic basis, especially in view of the recent paper by Berger and Sachs[18] wherein they report a case of preceptive deafness associated with prophylactic use of tetanus antitoxin and cite four previously reported cases of auditory nerve involvement after the use of tetanus antitoxin. In their discussion of the pathology associated with the neurologic complication after the injection of serum, they cited the following statement from Rackemann:[19a]

"The simplest statement that can be made is that, just as edema of the skin occurs in urticaria, so edema of the nerve occurs with consequent neuritis as a form of serum sickness."

There was certainly enough urticaria of the skin in the case presented here to substantiate an allergic process, but whether this was related primarily to the uveitis, per se, cannot be stated.

Cutter,[19b] in 1936, reported a similar case of deafness in a boy who had clinical tetanus. One week after intensive serum therapy by vein, by spinal injection, and by muscle injection there developed deafness, tinnitus, diplopia, and giant urticaria.

Kraus and Chaney [19c] attributed the pathology of serum disease of the nervous system to a "primary disorder of the blood vessels causing nutritive impairment of the tissues of the nervous system and interfering temporarily as a rule with the activity of the nerve fibers and cells but occasionally causing cell death and parenchymal necrosis." Such a vascular disorder might also explain the patchiness of the alopecia as well as the patchiness of the vitiligo in much the same manner as the patchy urticaria occurred.

I have no argument to offer that the alopecia, poliosis, and vitiligo are not the result of dysfunction of the hypothalamus. With the above-cited work of Bakay[16a] and Wislocki and Leduc[17] in mind, I feel that none is needed. If we stop to think for a minute, why shouldn't the hypothalamus be severely traumatized in this condition in view of its

proximity to the chiasm, the cavernous sinus, and its exposure to any and all pathogenic agents (virus and otherwise) that happen to be in the fluid of the basal cistern?

Conclusions

I feel that there is no doubt that I have here presented a case of an obvious uveitis as well as an obvious encephalitis. I believe that there is enough evidence in this case report to warrant the assumption that the uveitis was induced either by a sensitivity to the toxic lens substance of the hypermature cataract or a virus which was introduced into the right eye at the time of extracapsular lens extraction, or a combination of both.

Injection of lens substance into the skin and/or culture of aqueous from the right eye or of spinal fluid in the chick allantoic membrane should have been done but were not.

This patient did definitely exhibit a marked allergic reaction in the form of massive urticaria, and one is tempted to believe that the alopecia areata, poliosis, and vitiligo might well be on the same basis. Whether the allergic response was to lens substance, to diseased uveal tissue, to a secondary inflammatory lesion in the hypothalamus, or to one of the medications cannot be stated.

Summary

A case of uveitis associated with alopecia, poliosis, vitiligo, and dysacousia following extracapsular extraction of a hypermature cataract has been presented. Bilateral uveitis, associated with the alopecia, poliosis, vitiligo, and dysacousia, has long been known as the Vogt-Koyanagi syndrome but has never been reported in its entirety as the result of intraocular surgery. The positive pigment test, along with the bilateral uveitis following surgery, is consistent with the diagnosis of sympathetc ophthalmia.

I feel that sympathetic ophthalmia and the Vogt-Koyanagi syndrome (which I would call uveo-encephalitis in agreement with Cowper[20]) are basically the same entity and of the same etiology, although the etiologic factor need not be the same agent in all instances.

Further, I feel that one form is merely the mirror image of the other. By this I mean that, in the so-called Vogt-Koyanagi syndrome the etiologic agent gains entrance to the cranial contents and progresses thence to the eye; whereas, in the sympathetic ophthalmia form, the etiologic agent gains entrance to the eye and progresses from there to the cranial contents.

Penicillin, aureomycin, and terramycin were not beneficial in the treatment of this case. Cortone topically and subconjunctivally was of slight benefit as long as it was used but did not bring about complete quiescence of the disease process and was of only temporary benefit.

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HARADA'S DISEASE TREATED WITH CORTISONE*

Report of a typical case

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In 1926 Harada[1] described a disease entity characterized by the development of bilateral detachment of the retina in the course of a low-grade uveitis. He reported his findings in five cases which he had followed from beginning to end in Japan between 1922 and 1925. Later this rare disease was reported by a number of other Japanese observers and by Salus[2] in Germany (1932) and Magitot and Dubois-Poulsen[3] in France (1939).

Rados[4] in the United States (1940) was the first to report a case in the English language and a total of 10 cases,[4-9] including the one to be described in the present report, have now appeared in the American literature.

The disease seems to affect principally the more pigmented races and to occur more frequently in Japan than elsewhere. It is interesting that of the 10 American cases, four were in Negroes, one was in a Japanese, four were in patients of Italian extraction, and in one case, the patient was reported as "white."

Harada's disease

Clinical picture

The following summary of the clinical course of Harada's disease is based chiefly on Harada's[1] own very fine description of which a full English translation has only

* From the Department of Ophthalmology of the University of California Medical Center at San Francisco.

recently become available. This was obtained in Japan through General C. B. Sams by Dr. Lee Garron.

Harada's disease develops after a prodrome of general malaise and meningeal irritation as a bilateral, diffuse, exudative choroiditis or uveitis; in the course of the uveitis, retinal and optic-nerve edema supervene and are followed by bilateral retinal detachment. The onset is acute and severe but the subsequent course is extremely sluggish with spontaneous recovery in from six to 12 months. During its chronic phase, the development of complications may confuse the diagnosis.

At onset, and usually for some three or four weeks thereafter, the patient complains chiefly of loss of vision, of headache and loss of appetite, and sometimes of nausea and vomiting. According to Cowper,[5] meningeal symptoms of one kind and degree or another occur in the first stage of the disease in 90 percent of cases. Positive Kernig and Brudzinski signs, with stiffness of the neck, have been observed. One of the patients reported by Magitot and Dubois-Poulsen[3] was delirious early in the disease; another was unconscious at the onset and later developed a paresis of the sixth nerve.

Increase of lymphocytes in the cerebrospinal fluid, usually associated with some increase in the cerebrospinal pressure, is a common finding. Friedenwald and McKee[10] found 70 cells per cu. mm.; Bruno and McPherson[6] found between 86 and 90 cells per cu. mm. in two of their cases and a normal count in the other two; and Farnarier and Mouren[11] found 200 cells per cu. mm. in their case. In one of the cases reported by Bessiere and Arcelle,[12] trephination disclosed an opticochiasmatic arachnoiditis. These findings influenced Rubino[13] to express the opinion that Harada's disease should be regarded primarily as a uveomeningitis.

Eye findings

In this first stage of the disease the cornea, anterior chamber, and iris are to all intents and purposes normal, although varying degrees of precipitation may be seen on the posterior surface of the cornea (Okamura[14]). The pupils are slightly dilated and their reactions to light markedly diminished.

Shortly after the appearance of the meningeal symptoms, or occasionally coinciding with it, the uveitis begins to develop.[5] In Farnarier and Mouren's case[11] the uveitis did not appear until the 15th day.

Some observers have considered it typical of Harada's disease for inflammatory signs in the anterior segment to be either lacking or minimal, but Cowper[5] states that at least half the cases reported in this country have shown extensive involvement of the anterior segment. In the case presented in this report it was involved only very slightly.

With the development of the uveitis, ophthalmoscopic examination reveals a neuroretinitis, and in most cases the vessels near the disc show perivascularitis.[14] Vitreous opacities and chorioretinitis now develop. The inflammation extends into the periphery, rapidly in some cases and slowly in others, and the fundus takes on the appearance of diffuse chorioretinitis. Sometimes the peripheral region is affected first and the fundus shows a diffuse chorioretinitis with cloudiness and edema of the entire retina which gradually increases in severity.

Coincident with the fundus changes there is a reduction in vision and light sense and a limitation of the visual fields. When the area near the disc is affected chiefly, there is a high degree of visual disturbance with marked enlargement of the blindspot; when the fundus is affected from the periphery, the visual fields are contracted concentrically. In either case there is marked reduction in the light sense and resultant night blindness.

A characteristic finding in all cases is pronounced edema of the retina. The papilla is apparently depressed below the level of the retina, and as the edema increases the retina around the papilla becomes funnel-shaped This finally induces a peripheral detachment of the retina. Retinal hemorrhages, either

striated or dotted, and occurring around and a short distance from the disc, are occasionally noted at this period. Okamura[14] states that the vessels, especially of the periphery, show periphlebitis in from two to five months after the onset of the disease.

As the disease progresses, there is a gradual sinking of the exudated fluid and this increases the peripheral detachment of the retina below. Okamura[14] found detachment in the lower periphery in nine of his 16 cases. The severity of the detachment corresponds to the severity of the disease. Small detachments disappear spontaneously but the severe ones tend gradually to enlarge until, coincident with the subsidence of the chorioretinitis, resorption of the subretinal exudate begins. When this occurs the detached retina flattens and the area of detachment lessens.

When the retina has become entirely flat, numerous white spots appear. These are round, one to three times the diameter of the central vessels, and apparently are formed by exudate accumulating on the posterior surface of the retina. According to Hamada,[15] they ultimately disappear.

A different white spot may be seen during the early stage of the inflammation, but this is irregular in shape and disappears as the inflammation progresses.

Still another type of white spot appears in some cases; in mass these spots looks like cellular infiltration but they are regarded as the cicatrix of atrophy of the choroid and most of them do not disappear when the inflammation subsides. In cases in which the choroidal inflammation is severe, mild posterior synechias and a few deposits on the posterior corneal surface may develop. In a typical case these changes are usually slight; they sometimes occur in the convalescent stage when the inflammation has already largely subsided.

Recovery

The vitreous opacities and the edema of the retina gradually decrease with the abatement of the retinal detachment. The retina gradually recovers its function, and the vision, the visual fields, and the light sense begin to return to normal. In mild or moderate cases the important changes usually disappear in from two to three months although the fundus still shows a diffuse chorioretinitis which is occasionally modified by the appearance of a new lesion. In the average case it requires an additional two or three months for the condition to subside entirely. In one of Bruno and McPherson's cases[6] it took one year for the vision to return to normal.

In severe cases, and depending upon the changes in the fundus, for example, if the macula is involved, there may be permanent impairment of visual function. When the retinal detachment persists over a long period of time, there may be permanent limitation of the visual fields and impairment of dark adaptation. After complete recovery the fundus is diffusely red, the choroidal circulation is visible, and there is considerable fibrous tissue in and around the disc which looks white (Harada,[1] Okamura,[14] Hamada[15]).

There is also an accumulation of pigment around the disc which at times makes this area look as if it had been smeared lightly with dark paint. Round and irregularly shaped areas of pigmentation are scattered over the retina. There seems to be diffuse pigmentation in the pigment layer, and pigment spots between the epithelial layer and the blood vessels; these are sometimes in the same layer as the contracted and dotted atrophic spots. Okamura[14] found this pigmentation most marked in those cases in which the retinal detachment had been severe.

Complications of Harada's disease

The commonest ocular complication of Harada's disease appears to be glaucoma. Okamura[16] in his first report described two cases that developed secondary glaucoma and required iridectomy. Givner's patient[6] also developed secondary glaucoma but did not require surgery. The glaucoma in Cowper's patient[5] responded to Furmethide.

Rados'[4] first patient developed hypotony, seclusion of the pupil, vascularization, and bilateral complicated cataracts.

The general complications include a variety of conditions. Okamura[14] found dysacousia in six of his 16 cases and disturbance of the vestibular function in six. There were skin complications in 66 percent of his cases; these included edema of the scalp, seborrhea, alopecia, poliosis (including poliosis of the eye lashes), and vitiligo. Cowper,[8] Charamis,[17] and others have reported similar findings in their single cases, and Bessiere and Arcelle,[12] as already mentioned, reported an opticochiasmatic arachnoiditis.

Pathology

Histologic examination of tissue has been possible in three cases. Okamura[16] reported his findings in two cases in which an iridectomy had been performed to relieve a glaucoma.

In the first case the iris showed marked thickening with cellular infiltration of round cells and migration of pigment. The infiltration, composed principally of lymphocytes, showed "tubercular groupings" in various places. In one area there were numerous epithelioid cells, some of them resembling Langerhans' giant cells.

In the second case, in which the tissue was examined 10 months after the onset of the disease, there was inflammatory cellular infiltration and hyperemia. Some areas showed fibrous degeneration. Granulation tissue was not pronounced but there was a diffuse infiltration of lymphocytes and other cells and some migration of epithelioid cells.

It was in part from these findings that Okamura concluded that the disease was related to sympathetic ophthalmia and a sequela of tuberculosis. It must be remembered that at this time the reports from Vienna seemed to indicate that sympathetic ophthalmia was tuberculous.

Givner's[6] patient with Harada's disease required bilateral iridectomy. Microscopic examination of the tissue revealed infiltration of round and plasma cells which was interpreted as evidence of the chronicity of the process. There were a few eosinophils. Iris tissue stained by the Ziehl-Nielson method did not reveal tubercle bacilli.

Etiology

The cause of Harada's disease has not been determined. In two cases observed by Okamura[16] over a long period of time, iridectomy was required to relieve a complicating glaucoma. The histologic findings resembled those of advanced sympathetic ophthalmia and of the granulation tissue of tuberculosis. In view of these findings, and the tuberculous lesions noted in the lungs of both patients, Okamura concluded that there was some relationship between Harada's disease and tuberculosis. According to Cowper,[8] however, the work of other investigators has pretty well excluded as etiologic possibilities most of the common causes of uveitis, that is, syphilis, tuberculosis, and foci of infection.

There is some evidence that the causative agent may be a virus. Takahashi[18] inoculated rabbits with vitreous from affected eyes. By means of intracisternal inoculations he produced a descending optic neuritis and uveitis in two of five attempts. With spinal fluid from affected individuals, he was able to produce cerebral changes and optic neuritis in rabbits, and by injecting crushed brain substance from an affected animal into the cisterna of another, he produced optic neuritis and iridocyclitis.

Tagami's[19] inoculation of the vitreous of rabbits with subretinal fluid from a case of Harada's disease also resulted in uveitis which was microscopically like sympathetic ophthalmia.

Friedenwald and McKee[10] inoculated rabbits with the spinal fluid of a woman with uveitis, papillitis, and a cerebrospinal cell count of 70 per cu. mm., both directly and after passage through a Berkefeld filter. With material from the inoculated rabbits they were able to produce inflammatory le-

sions in the eyes of rabbits, dogs, and cats.

As Walsh[7] points out, however, rabbits are susceptible to a widespread disease known as "virus disease 3," and it is difficult to prove that a postinoculation inflammatory reaction is due to the inoculation and not in fact the result of an activation of "virus 3" by the extraneous injection.

Treatment

Harada's disease has for the most part been treated locally as an iritis or uveitis, that is, with atropine, dionin, heat, and "other treatments for iritis in general."[14] For systemic administration a great variety of therapy has been advocated. Harada[1] used iodides, aspirin, and sedatives. To these Okamura[14] added bromides and calcium and, in several cases, autoserum. Nakamura[20] felt that what he called "tuberculosis therapy" was effective, and Okamura, believing as he did that tuberculosis played a part in the disease, advocated consideration of the general physical condition and especially of any existing tuberculosis of the chest.

In the cases reported in the United States, a number of therapeutic agents have been applied in addition to local uveitis treatment but with equivocal results. Rados[6] used foreign-protein therapy and tuberculin injections. Cowper[5] used penicillin and streptomycin until it was apparent that they were having no effect. Givner[6] used histaminase, weak doses of tuberculin, and "plenty of vitamins, including vitamin P." Bruno and McPherson[8] treated their patients "symptomatically." In the case reported herein, cortisone was used.

Incomplete syndrome of Harada

Walsh[7] has suggested that there is an incomplete form of Harada's disease and that detachment of the retina is probably not an essential part of the syndrome. If bilateral uveitis with pleocytosis can be considered a mild form of the syndrome, the disease is certainly much less rare than it is commonly considered to be. Walsh cites several cases of this "incomplete" form.

Report of a case

September 6, 1951. Mrs. M. M. T., a Japanese woman, aged 31 years, was first seen in the office complaining of bilateral loss of vision. Twenty days previously she had noted haziness in her distance vision. From that time the vision had failed until, at examination, it was reduced to bare light perception with no central vision whatever. The loss of vision was accompanied by severe headache and ringing in the ears. The patient gave a history of 20 years of sinus disease.

Examination of fundi revealed clear media, yellowish discs with blurred edges, and some edema but not enough to fill the optic cups.

Field measurements indicated loss of field except for a crescentic sector below and temporally (fig. 1).

A papillitis involving the retrobulbar portion of the nervehead and the disc was presumed to exist. The headache, together with the history of long-continued sinus disease, suggested the nose as a possible source of the patient's difficulty. She was referred to an otorhinolaryngologist who found numerous polyps in the nose. These were removed and the sinuses drained at Children's Hospital.

September 8th. Two days later, while the patient was still in Children's Hospital, her fundi were re-examined. In addition to optic neuritis there were now large areas of de-

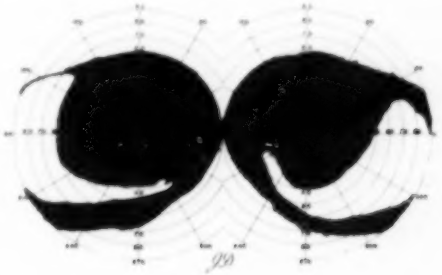

Fig. 1 (Cordes). Field of vision on September 6, 1951.

tachment in both eyes, some of them as high as 10 or 12 diopters. Further inquiry at this time elicited further evidence of meningeal involvement. On the basis of this involvement and its association with optic neuritis, detachment of the retina, and loss of vision, the condition was diagnosed as Harada's disease and the patient was transferred to the University of California Hospital for further study.

SEPTEMBER 10, 1951 (24th day of illness)

History. On rising in the morning 24 days prior to hospital entry, the patient first noted difficulty in seeing; there was a blurring of objects, similar to the normal distortion sometimes experienced on hot days. This persisted for about four days and was then gradually superseded by loss of central vision and onset of a dull headache involving the bridge of the nose and the side of the neck, and radiating upward into the ear and vertex. These symptoms have persisted without change to date in spite of various types of medication and surgical drainage of the sinuses.

There have been spells of dizziness without vertigo but no nausea or vomiting. The patient has experienced some tinnitus and voices sound high-pitched. There has been some neck stiffness associated with the headache but no other sensory or motor complaints. In the afternoons there has been fever up to 100° F. without chills.

The patient had been working at peach-picking during the three weeks preceding the onset of symptoms, but this she had done in previous years without ill effect. She could give no history of previous sensory or motor disturbance or of any other disease.

The patient's parents are living in Japan; she knows of no familial diseases. She is married and her husband and their three children are all well. She was born in the United States but lived in Japan until 10 years ago. She now lives near Fresno on a ranch surrounded by grape and cotton fields and by peach orchards; these have not been sprayed since July. Her husband works in a garage. She has used patent medicine nose drops for many years. In connection with her present illness she has had various types of injections and postoperative medication whose exact nature she does not know.

Physical examination. Temperature, 36.6; respiration, 20; pulse, 76; blood pressure, 112/76 mm. Hg. The patient is a well-reveloped, well-nourished Japanese woman in no acute distress. Skin clear; no vitiligo; no alopecia. Ear, nose, and throat examinations essentially negative except for minimal injection of throat. Poor dental hygiene; mouth not otherwise remarkable. Neck slightly stiff; Kernig's sign negative. Reflexes active and equal; deep tendon reflexes. Sensations normal to pinprick, position, and light touch. Stereognosis normal.

Eye examination

Vision. R.E. and L.E., light perception only; unable to count fingers.

External examination. Negative. Pupils dilated and fixed (scopolamine). Extraocular muscles normal.

Fundi. Disc blurred and areas of detachment same as noted on the 22nd day.

Slitlamp examination. Aqueous flare; many slowly moving cells in the aqueous; no ciliary injection; a few scattered posterior synechias.

Lumbar puncture:

Pressure—96 mm. water
Jugular compression—Free use to 160 mw and rapid fall
Appearance—Clear, colorless
Cells—WBC 2, RBC 50 (not crenated)
Pandy—2+
Protein—56 mg. percent
Chloride—681
Sugar—45
K & K—0
Gold—00122/0000

Fasting eosinophil count: 94 mg./cu.mm.

Na+ .....132 meq/L
K+ .....3.9 meq/L
FBS .....84 mg. percent

Diagnosis. Harada's disease.

Treatment. Cortisone therapy was insti-

tuted September 10th, as follows: 200 mg. the first day; 150 mg. the second day; 125 mg. the third day; 200 mg. per day for the succeeding 11 days, that is, until September 26th when the dose was cut to 100 mg. per day; on September 29th it was further reduced to 75 mg. per day, on October 8th to 62.5 mg. per day, on October 12th to 50 mg. per day, and on October 22nd to 37.5 mg. per day until the patient left the hospital on November 1st.

OBSERVATIONS DURING AND AFTER TREATMENT PERIOD

September 12th (26th day of illness). *Fundi.* R.E., definite change since examination September 10th; superior and inferior detachment more marked; only a central horizontal swath of undetached retina remains. L.E., no apparent change since September 10th. Patient believes that for the past 24 hours (after a total of 30 hours of cortisone therapy) she has had a return of a little central vision and some slight increase in the acuity of the peripheral vision. Objectively there is more retinal detachment but less edema.

September 21st (35 days). Evidence of improvement in both eyes. Field defects marked in superior fields, corresponding to edema and detachment of inferior retinas which now show a few scattered black areas. Disc sharp with macula visible in the left eye; right disc still edematous. For the first time the patient has color perception. No neck rigidity or headache today. Fields show improvement.

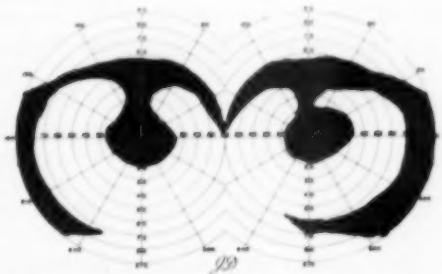

Fig. 2 (Cordes). Field of vision on October 3, 1951.

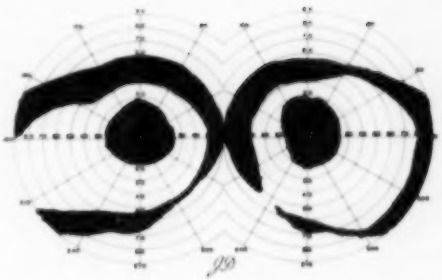

Fig. 3 (Cordes). Field of vision on October 26, 1951.

September 24th (38 days). Less edema in both eyes. Cortisone effects now apparent, that is, buccal fullness, acne, hirsutism.

September 27th (41 days). Color perception normal. Discs are sharp and have deep cups. Retinas are fairly well reattached superiorly but still detached over entire inferior poles. Areas of exudation and repair are visible along detached inferior retinas.

October 3 (47 days). Progress has been gradual, though slow, from the time cortisone therapy was instituted. After seven or eight days most of the scattered, isolated areas of detachment had reattached and a scattering of pigment has appeared in these areas. The inferior detachment has remained high but is slowly receding. There appears to be increased exudation on the posterior retinal surfaces. Most of the exudates are two blood-vessel-diameters in size. Figure 2 shows the fields.

October 26 (70 days). Vision in both eyes 2/200. The detachment is now flat everywhere except at the periphery below. There is considerable mottling and disturbance in the retinal pigment epithelium. The field is improved (fig. 3).

November 1st (76 days). Vision: R.E., 5/200; L.E., 6/200. The fields are taken with difficulty and vary a good deal but seem to have improved. Patient discharged from hospital but requested to return to office.

November 16th (3 months). Retinas flat except on the nasal side of the left eye. Fields improved but a central scotoma persists.

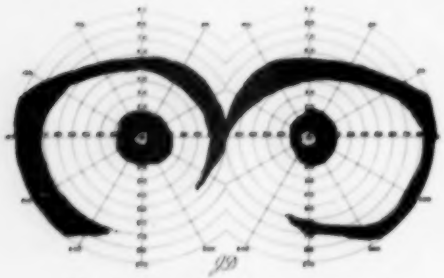

Fig. 4 (Cordes). Field of vision on December 20, 1951.

Slitlamp examination negative.

December 20th (four months). Vision: R.E., 20/70; L.E., 20/100. Fields improved. R.E. shows some central field. There is still some edema on the nasal side of the left eye. Both eyes are now beginning to show pigment changes in the pigment epithelium scattered over the whole fundus (fig. 4).

January 31, 1952 (five and one-half months). Vision both eyes 20/30, slowly. Fields show an annular scotoma with fixation area larger. Nasal periphery still shows a little edema in both eyes but more in the left. The patient still sees a flickering in that portion of the field.

March 12th (seven months). Vision: R.E., 20/20−3; L.E., 20/30+4. No evidence of edema anywhere in the fundus of either eye. Fundus examination of both eyes reveals an accumulation of pigment around the disc with marked pigment changes and clumping over the whole retina, apparently limited primarily to the pigment layer. There are other pigment spots, round and irregularly shaped, scattered over the fundus. These appear to be situated in part between the pigment layer and the vessels. Here and there are pigment spots over the vessels. The larger vessels of the choroid are clearly visible in parts of the fundus. Cortisone therapy has been discontinued.

May 14th (nine months). Fields of vision normal. Vision: R.E., 20/20−2; L.E., 20/30+4. The fundi have not changed since the previous examination. Slitlamp examination negative.

Case summary

A case of typical Harada's disease was treated with cortisone. At the onset there were symptoms of general malaise and meningeal irritation accompanied by tinnitus and the high-pitched sound of voices. These symptoms were followed four days later by progressive loss of vision, edema of the optic disc and retina, and bilateral detachment of the retina which was complete 26 days after the onset of the disease. At this time the vision was reduced to bare light perception in a lower crescent of the fields of vision.

On the 25th day the administration of cortisone was begun and on the 26th day the condition began to clear.

It improved gradually until at the end of two months from the onset of the disease the detachments had disappeared except in the lower periphery. Fields and vision, however, did not return to normal until five months later. The fundi showed the usual pigmentary changes.

The marked changes of Harada's disease usually disappear in from two to three months but an additional five to 10 months are required for the fields and vision to return to normal, or nearly normal. The present case would seem thus to have run the usual course.

Cortisone therapy was administered over a long period of time. From the initial dose of 200 mg. on the 25th day, it was continued in gradually reduced amounts over a period of six months. At that time the fields and vision had returned to normal. The patient stated 30 hours after the drug was started that she felt her vision was better, but no objective improvement was noted at that time or until the 35th day.

It must be concluded that cortisone had no effect, either beneficial or deleterious, on the course of the disease.

Discussion

In the recent literature the probability of a relationship between Harada's disease,

Vogt-Koyanagi syndrome, and sympathetic ophthalmia has been emphasized. This is not a new conception. In his original paper Harada[1] wrote, "Considering and comparing the findings, it is obvious that the disease in this report and sympathetic ophthalmia are very closely related."

In discussing the cases of uveitis reported by Vogt and Koyanagi in which there were associated hair changes, Harada stated further, "It is still possible that some connection between the two diseases may exist, as the principal symptom of the above cases, that is, change in the hair, was also observed in my third case."

And again, "There were many points of resemblance between this disease (Harada's) and sympathetic ophthalmia and idiopathic uveitis (Vogt-Koyanagi syndrome)."

Both Okamura[14] and Hamada[15] regarded all three conditions as essentially the same disease, and sympathetic ophthalmia as a type in which there was a history of trauma in one eye. In the American literature there have been attempts to define each of the syndromes as a single entity and other attempts to relate them closely. These diverse opinions will be reviewed briefly.

Vogt-Koyanagi syndrome

Typically this syndrome is a severe bilateral uveitis accompanied by alopecia, poliosis, vitiligo, and auditory disturbances. Parker[21-22] and Rados[23] state that the association of alopecia and poliosis is constant and the association of vitiligo and partial deafness frequent. Rados considers this one basis for differentiating sharply between the Vogt-Koyanagi syndrome and Harada's disease in which "alopecia and poliosis do not figure as an integral part." He states further that detachment of the retina occurs only very rarely in the Vogt-Koyanagi syndrome and that the severe bilateral uveitis of the Harada type represents a separate entity differentiable by its association with bilateral retinal detachment and its spontaneous healing. He makes a further point of the fact that cataract may follow the Harada type of uveitis whereas there is no cataract formation in connection with the uveitis associated with alopecia and poliosis.

This difference is also mentioned by Koyanagi,[24] but in a review of 29 cases of Vogt-Koyanagi disease, Carrasquillo[25] found seven cases of complicated cataract.

Among the observers who feel, on the other hand, that there is a definite relationship between Harada's disease and the Vogt-Koyanagi syndrome are Rubino,[13] Magitot and Dubois-Poulsen,[3] Rosen,[26] and more recently Cowper.[5] Certain it is that the two diseases have features in common which suggest they may not be separate entities.

Like Harada's disease the Vogt-Koyanagi syndrome always occurs in the more pigmented races (Rosen[26]). Moreover, the constancy of the association of alopecia and poliosis with Vogt-Koyanagi disease, as attested by Parker and Rados, has not been borne out by the findings of other observers. Carrasquillo[25] found alopecia in only 53 percent and poliosis in 82 percent, and Rosen[26] found alopecia in 73 percent and poliosis in 90 percent.

With respect to detachment of the retina, Rados[23] reported it as occurring rarely in Vogt-Koyanagi syndrome, but Rosen,[26] in his series of 47 cases, found detachment in five (12 percent), and Laval,[27] Puig Solanes,[28] and Bose[29] have reported it in a number of cases. Differentiation on the ground of these various associations can thus hardly be considered clear-cut.

A few histologic examinations of tissues from Vogt-Koyanagi disease have been made and the results are interesting in connection with the possible relation of this disease to the other two.

Matsuoka[30] examined the iris from a case and found a moderate infiltration of round cells, epithelioid cells, and plasma cells. There were sporadic groups of epithelioid cells but no caseation; the anterior limiting membrane was almost intact and the pigment epithelium partially destroyed.

Ogawa[21] saw diffuse round-cell infiltration in the iris, ciliary body, and choroid; it consisted of lymphocytes and a few fibroblasts; no epithelioid cells or giant cells were seen. Sugimoto and Kodama[22] found in the uvea a diffuse round-cell infiltration composed of lymphocytes, plasma cells, and fibroblasts. The pigment epithelium showed atrophy and there was hypertrophy of some of the pigment cells.

Sympathetic ophthalmia

Matsuoka[20] considered the findings of Harada's disease as almost identical with those of sympathetic ophthalmia, and Hamada[18] compared the clinical and histologic findings in numerous patients and came to the same conclusion. Okamura[16] also thought the two diseases were fundamentally the same. In his deSchweinitz lecture, Parker[22] emphasized the marked resemblance between Harada's disease and sympathetic ophthalmia on the basis not only of the uveitis seen in both but of the alopecia, vitiligo, poliosis, and deafness which, though rare in sympathetic ophthalmia, are complications common to both. It is noteworthy in this connection that there is a striking resemblance between the appearance of the fundi after recovery from sympathetic ophthalmia and their appearance after recovery from Harada's disease.

Rados,[23] on the other hand, regards sympathetic ophthalmia as quite distinct from both Harada's disease and Vogt-Koyanagi syndrome in that it occurs only after perforating injuries; he feels this outweighs the fact that poliosis, alopecia, and deafness may occasionally be associated with it.

In agreement with this point of view, Sugimoto and Kodama[22] classified idiopathic uveitis associated with vitiligo and poliosis as follows: (1) Harada's disease, (2) Vogt-Koyanagi type, and (3) a type transitional between Harada's disease and the Vogt-Koyanagi form. In their opinion the changes in all three types differed from those occurring in sympathetic ophthalmia which they considered a distinct disease.

Ogawa,[21] too, although he found the early changes of both diseases to be much alike, felt nevertheless that the two differed fundamentally.

It is thus apparent that while Harada's disease, Vogt-Koyanagi syndrome, and sympathetic ophthalmia have features in common, their precise relationship remains in doubt. As Cowper[5] sums it up, there has been an increasing disposition among recent writers to regard Harada's disease and Vogt-Koyanagi syndrome as clinical variations of the same condition. Whether sympathetic ophthalmia should be considered a related disease is more seriously in doubt.

Of theoretical interest is the explanation of sympathetic ophthalmia as an anaphylactic manifestation of sensitization to uveal pigment (Elschnig[33]), and its similarity to Harada's disease has suggested that the latter may also be an allergic manifestation. Peters[24] assumed that the same phenomenon could explain the occasional disturbances of hearing associated with sympathetic ophthalmia, and Cramer[25] applied the theory to the Vogt-Koyanagi syndrome, explaining the deafness as a result of the presence of pigment in the basilar membranes of the labyrinths.

The other associated symptoms (vitiligo, alopecia, and poliosis) have also been explained as anaphylactic manifestations, but experimental verification of the entire theory is lacking. Rones[26] performed cutaneous tests with uveal pigment in three cases but the reactions were negative in two of the three and negative also in a case of Carrasquillo'.[25]

Summary and Conclusions

1. A typical case of Harada's disease in a Japanese woman, aged 31 years, was followed throughout its course. Loss of vision was accompanied by general malaise, meningeal symptoms, and tinnitus. Edema of the optic discs and retinas progressed to bilateral

retinal detachment 26 days after the onset of the disease. At this time the patient was hospitalized and treated with cortisone. Two months later the detachment had receded except in the lower periphery. The field of vision and the visual acuity did not return to normal until seven months after the onset of the disease.

The fundi showed the usual pigmentary changes after recovery.

2. Cortisone was administered in a gradually decreasing dosage over a period of six months with no apparent effect on the course of the disease.

3. The similarities between Harada's disease, Vogt-Koyanagi syndrome, and sympathetic ophthalmia are discussed. The weight of current opinion favors the consideration of Harada's disease and Vogt-Koyanagi disease as clinical variants of the same condition. That they are also related to sympathetic ophthalmia seems to be more seriously in doubt.

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* The articles of Harada and Okamura were translated from the Japanese by Dr. Monoru Hiraga at the request of Brigadier General Crawford B. Sams of the United States Army Medical Corps who forwarded the complete translations to Dr. L. Garron from whom the translations were obtained.

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CATARACTS IN ALLOXAN-DIABETIC RABBITS*

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The study of lenticular changes has been accelerated in recent years by the experimental production of cataract by any one of several means. One method which has been widely employed is the study of cataract in experimental diabetes. It seems possible that the lesions produced are different in some respects from those found in elderly people but they may correspond with the lens changes seen in diabetes. Thorough study of these lesions may give us a better understanding of the pathogenesis of human cataract.

Lens changes have been described in experimental diabetes of various types. It has been known that following pancreatectomy such changes will occur. The animal which has undergone pancreatectomy, however, requires careful control of the diabetic state and maintenance of normal, or nearly normal, blood-sugar values.

The administration of alloxan, a uric-acid derivative, results in the development of diabetes in some of the surviving animals. The diabetes is the result of the destruction of the beta or insulin-producing cells of the islets of Langerhans of the pancreas. The experimental diabetes that is produced by this drug resembles that produced by administration of pituitary extracts and, in some respects, resembles the diabetes seen in some elderly obese individuals with very high blood sugars but no evidence of acidosis.

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These patients and the alloxan diabetic animals may require very large doses of insulin to achieve normal sugar levels; whereas, the pancreatectomized animal and human generally require only moderate doses of insulin. Of particular importance is the fact that the alloxan-diabetic rabbit may survive without insulin treatment and may develop no acidosis, but actually gain weight despite sugar concentrations of 400 to 500 mg. per 100 ml. of blood.

In 1937, Jacobs[1] observed the nephrotoxic effect of alloxan and, in 1943, Dunn, Sheehan, and McLetchie[2] reported the production of a permanent diabetes in rabbits by use of this chemical. Bailey[3] and his co-workers, in 1944, observed the appearance of cataract as a complication in some alloxan-diabetic rabbits and noted subcapsular and posterior cortical changes which became apparent four to six weeks after the injection of alloxan. Kennedy and Lukens,[4] however, failed to observe lens changes in alloxan-treated rabbits observed for a period of over six weeks.

Many other investigators have studied the clinical and biochemical changes occurring in the lenses of treated animals, generally observing changes after a period of several weeks, and occurring only sporadically in the diabetic animals.

Bellows and Shoch[5] (1950) reported lens changes at the first weekly examination after the alloxan injection and found that these changes consisted of minute vacuoles in the extreme equatorial region of the lens; histologic studies of these lenses showed that the changes consisted chiefly of a disturbance of the nuclear bow.

Patterson[6] (1952) found that rats, made diabetic with dehydro-ascorbic acid or alloxan, developed cataracts if the blood sugar was higher than 225 mg. per 100 ml; and that these cataracts resembled galactose cataracts.

Cohen and Kok-van Alphen[7,8] (1950) were apparently the first to report the possibility of spontaneous recovery of immature cataracts and the prophylactic effect of insulin in alloxan diabetic rats and more recently (1953) the regression of well developed cataracts in alloxan diabetic rats treated with insulin; whereas, no improvement was noted in untreated control animals.

We have had the opportunity to observe closely the eyes of alloxan-diabetic rabbits at frequent intervals and over a comparatively long period of time.

Methods

Alloxan monohydrate was injected intravenously into this group of rabbits at varying rates of speed and in varying doses. After 24 to 48 hours, observations including blood sugar, urinary volume, and urinary glucose were made.

The animals were classified as nondiabetic, questionably diabetic, and mildly or severely diabetic on the basis of the level of urinary and blood glucose. At the time of death of the animals, determination of blood acetone, liver, and blood lipids, and other chemical as well as histologic studies were performed.

The eyes of these animals were observed with both ophthalmoscope and slitlamp. The eye studies were performed independently of the chemical studies and the observer was not informed of the blood or urinary sugar findings.

Early in the experiment only one-percent atropine-sulfate solution was used for mydriasis. However, it was soon realized that the resulting pupil dilatation was not sufficient to see the earliest lens changes. When atropine was followed by 10-percent neosynephrine solution the ensuing pupillary dilatation was much better, although even this combination failed in a few of the animals.

Results

In these experiments, a total of 177 rabbits were injected with alloxan over the past five years. Of the 90 animals which survived after six days, 46 developed definite diabetes. Every diabetic animal showed cataract for-

mation. These lens changes were always bilateral, were initially observed in both eyes at the same time, and were of similar extent and severity in both eyes.

Early in the study the cataracts were first noted between the 15th and 21st day. As the pattern of the progression of the cataracts developed and the earliest seemed to appear in the equator, it became evident that wider pupillary dilatation was necessary for proper study. These suspicions were soon confirmed as a result of more adequate observations following the mydriasis produced by the atropine-neosynephrine combination.

In all of the definitely diabetic rabbits, the lens opacities were seen within the first week; in most of the animals the earliest signs were detected within 48 hours after the alloxan injection.

The progression of the lens changes followed a definite pattern and the extent and severity of these changes appeared to be directly proportional to the severity and the duration of the diabetes. The animals were examined at least twice weekly and the constantly changing picture was remarkable. Figure 1 diagrammatically demonstrates the lens changes as seen with the ophthalmoscope in a typical rabbit with a very severe diabetes.

The earliest apparent changes which occurred within 24 to 48 hours consisted of an increased density about the equator. By the end of the first week, very fine radial striations arranged about the entire periphery of the pupillary reflex were seen. These striations were soon recognized as radially arranged tiny vacuoles which increased in

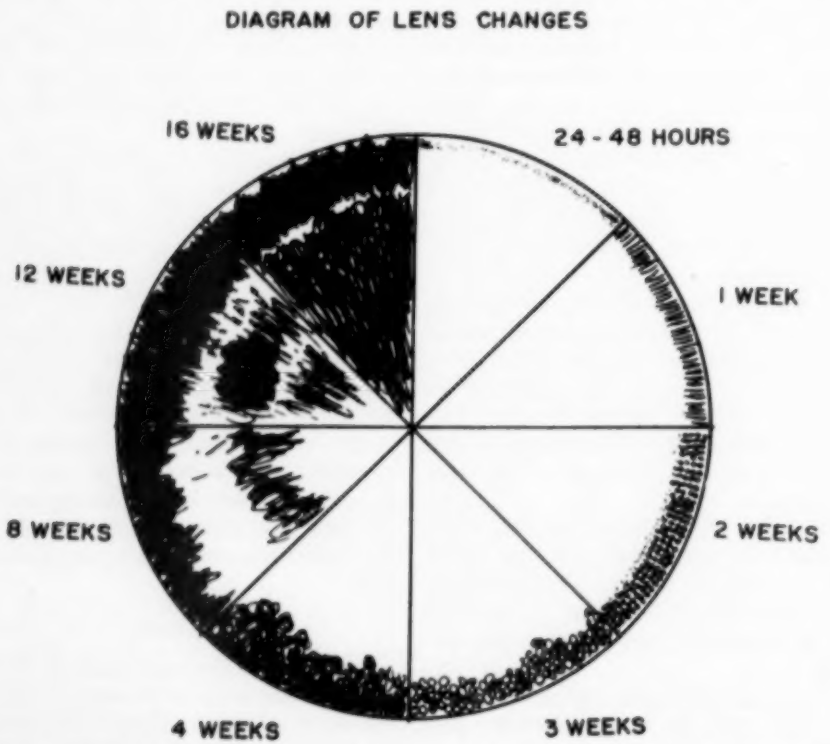

Fig. 1 (Naidoff, Pincus, Town, and Scott). Diagram of the typical progression of the cataract in severe diabetic rabbits as seen with the ophthalmoscope.

size and appeared to coalesce. Slitlamp examination during the third week showed that these vacuoles straddled the equator extending into both the anterior and posterior cortex.

As the cataract progressed the opacities in the periphery of the lens became more dense with more vacuoles appearing and then disappearing in a constantly changing fashion. After about eight weeks, fine feathery opacities arranged in a radial pattern first appeared deep in the cortex, particularly in the posterior portion.

These changes continued so that usually by the 16th week the opacities were of such a degree that the fundus could not be seen distinctly, and they appeared to occupy the posterior cortex and equator, extending to a lesser extent into the anterior cortex.

The sequence of the lens changes in rabbit No. 278 was typical of the cataract formation in severely diabetic animals. Figure 2 diagrammatically shows these lens changes together with a plotting of the blood sugar levels. This animal was observed for 116 days at which time it was killed; throughout this period its blood sugar was consistently above 500 mg. percent.

Although the lens changes were apparent just as early in rabbits with mild diabetes, the cataracts did not progress as rapidly nor did they attain the extent and density of those seen in severely diabetic animals. In most of the mildly diabetic rabbits, the lens changes rarely progressed beyond the picture of amphorouslike opacities and large vacuoles more or less confined to the equator and the periphery of the posterior cortex.

In a few of the rabbits, the formation of the cataracts did not progress in a definite manner but there were periods of progression and regression. In several of these animals the lens changes varied remarkably on two consecutive examinations. It soon became evident that these variations in the cataracts of these animals coincided with fluctuations in the blood-sugar levels and the output of urinary glucose.

Figures 3 and 4 are self-explanatory and show apparently reversible lens changes, these opacities actually decreasing when the blood sugar levels fell and increasing when the blood sugar levels rose.

In four animals, an initial mild diabetes with typical lens changes developed immediately after the alloxan injection but after about four to six weeks these animals apparently recovered. Blood-sugar levels

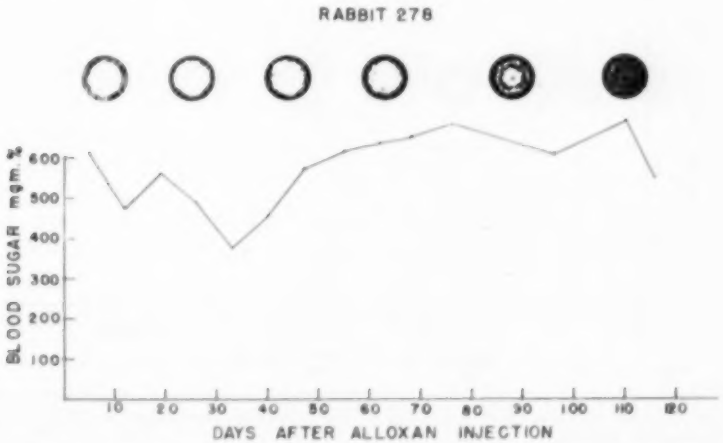

Fig. 2 (Naidoff, Pincus, Town and Scott). The blood-sugar levels and the lens changes in rabbit No. 278 which was severely diabetic.

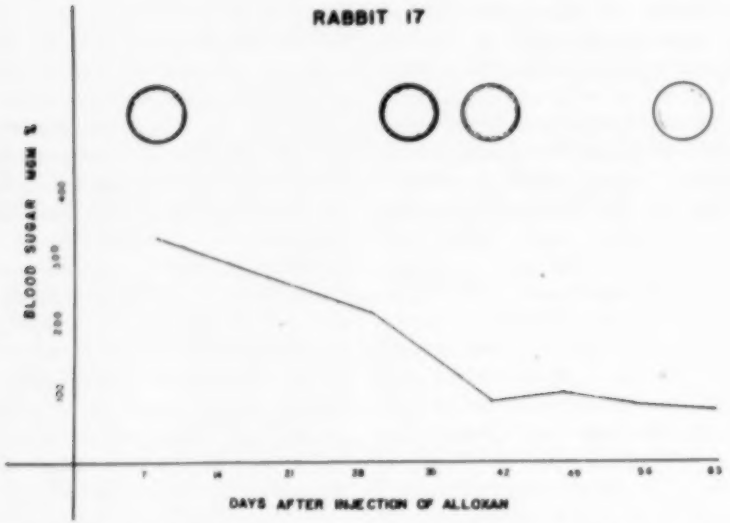

Fig. 3 (Naidoff, Pincus, Town and Scott). Course of blood-sugar levels and lens changes in rabbit No. 17 in which a spontaneous recovery occurred.

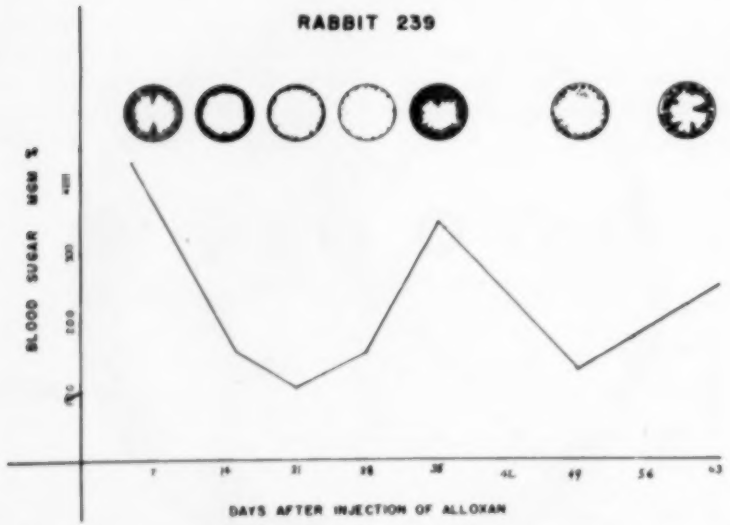

Fig. 4 (Naidoff, Pincus, Town, and Scott). Illustration of regression of lens changes with fall in blood-sugar levels and progression of the changes with a rise in blood-sugar levels in rabbit No. 239 which was moderately diabetic.

dropped to normal and all diabetic symptoms disappeared. The lens changes regressed until only a ring of faint punctate opacities remained in the equator which appeared more dense than in the normal animal. Figure 3, showing the course of rabbit No. 17, illustrates these findings.

Rabbit No. 239 (fig. 4) was a moderately severe diabetic who during the first 10 weeks showed fluctuations in the blood-sugar levels with correlated fluctuations in the degree of the cataracts. The cataracts eventually progressed to such an extent that the animal had to be killed because of blindness.

When the correlation between the lens changes and fluctuations in the blood-sugar levels was established, insulin therapy was given to another group of rabbits in which a permanent diabetes with cataracts was definitely present following alloxan injection. Perfect control of blood-sugar levels was never attained in these animals; but the diabetes appeared to be controlled to a great degree as evidenced by the improvement in their general condition as well as by the recurrence of severe diabetes when insulin administration was stopped.

Figures 5 and 6 show the regression of the lens changes when insulin was started on the seventh day after the alloxan injection and then the rapid progression of the changes soon after the insulin was stopped on the 64th day.

Recently some of our rabbits were fed DDD (2,2-bisparachlorophenyl)-1, 1-(dichloroethane). In rats, this drug causes adrenal cortical hypertrophy and renders them insulin sensitive (Nichols and Gardner,[9] 1951); and in dogs pretreated with this compound severe hyperglycemia did not develop following alloxan injection (Nichols and Sheehan,[10] 1952). Brown[11] (1953) noted that his rats at the end of 12 weeks after alloxan lost all signs of diabetes if fed DDD. DDD was fed to rabbits No. 77 and No. 78 after the insulin had been stopped and the diabetes and the cataracts were progressing rapidly. In both animals (figs. 5 and 6), the blood sugar levels began to fall and some regression of lens changes occurred.

The development of these lens changes appeared to be related to the blood-sugar levels alone. No correlation was noted between these changes and alterations in liver or blood cholesterol, phospholipid, or fatty acid. Nor were there demonstrable lesions in the

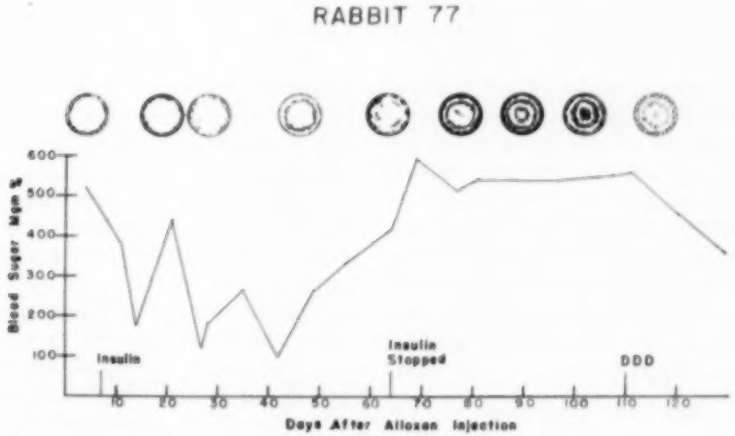

Fig. 5 (Naidoff, Pincus, Town and Scott). Plotting of blood-sugar levels and lens changes in rabbit No. 77, showing response to insulin therapy, rise in blood-sugar levels, and progression of lens changes when insulin therapy was stopped and then response to DDD administration.

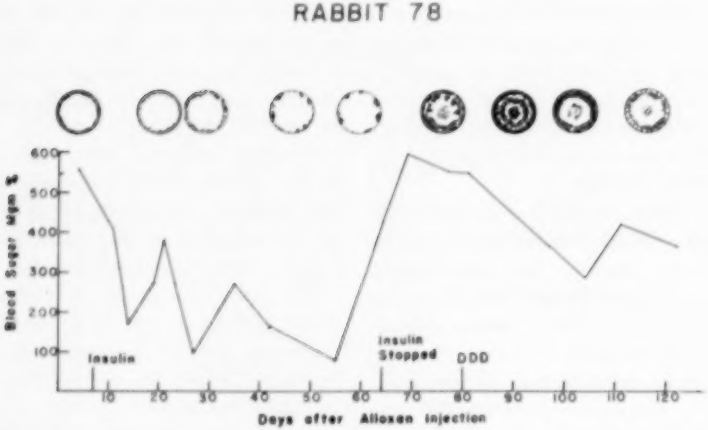

Fig. 6 (Naidoff, Pincus, Town, and Scott). Plotting of blood-sugar levels and lens changes in rabbit No. 78, showing response to insulin therapy, rise in blood-sugar levels, and progression of lens changes when insulin therapy was stopped and then response to DDD administration.

animals reported here either in the retinal, renal, cardiac, or other vessels.

It should be pointed out that these animals suffer from marked hyperglycemia and glycosuria without concomitant acidosis even though untreated. Although the blood sugar may be very high, there is a tendency to gain weight, although this is not great.

The fact that the lens changes tend to regress when the blood sugar is lowered by any one of several means, whether insulin, DDD, or phlorizin (as found by Patterson), suggests that these changes are produced by the blood-sugar level and not by other phases of the metabolic defect in diabetes. This is further suggested by the similarity between the lesions described here and those observed in galactosemia. We have been interested in the possibility that osmotic factors may play a primary role in the development of these changes as well as the possibility that specific enzymatic or other processes are interfered with by the physical effect of the high glucose content of the blood.

Summary and Conclusions

1. In this series of experiments, every rabbit which had definite diabetes as a result of the intravenous administration of alloxan showed lens changes in both eyes at the same time and the degree of involvement was similar. Where satisfactory dilatation of the pupil was obtained these changes were seen very early, within 48 hours of the injection, and it is presumed that similar early changes occur in all diabetic animals.

2. Although the pattern of the progression of the cataracts was constantly changing, a definite progression of the changes in the lens did occur and its extent and severity apparently depended upon the severity and the duration of the diabetes. It appeared to be directly proportional to both of these factors.

3. A number of the diabetic animals showed lens changes, the degree of which fluctuated very greatly and concomitant determinations of the blood-sugar levels and urinary glucose out-puts revealed striking correlated fluctuations at the same time.

4. In diabetic rabbits insulin administered early managed to control the disease and with the fall in the blood-sugar level the lens changes regressed. When the insulin therapy was discontinued and severe diabetes recurred the lens changes progressed rapidly. Preliminary studies with DDD which also tends to lower blood sugar levels in alloxan-

diabetic rabbits suggest that a coincident regression in the cataracts also occurs.

5. These findings would lead us to suspect that up to a certain point of development lens changes may be reversible.

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VARIATIONS IN CONCENTRATION OF IONS IN AQUEOUS HUMOR*

Following paracentesis in the contralateral eye

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The relative importance of the physiologic processes which regulate ocular tension still presents fundamental and perplexing problems. Recent work has stimulated investigation of these basic physiologic processes.

Mather and Shuman,† working on patients with normal eyes, have confirmed the previous observations of Ehrhardt‡ that, following electroshock of convulsive dosage in rabbits and humans, profound alterations of ocular tension, in otherwise normal eyes, were consistently demonstrated. These changes were considerably in excess of observed normal variations in ocular tension in a control series of individuals who were not subjected to electroshock.

The investigations of Mather and Shuman revealed a decrease in ocular tension to approximately one half of the preshock level, returning to the normal preshock tension within 30 to 45 minutes. In addition they noted that, if curare was used, this decrease did not occur but, instead, the ocular tension became elevated before it returned to preshock levels. When eserine was used with curare and electroshock, there was an increase in ocular tension, as noted with curare alone; however, there followed a decrease in tension not found without the eserine.

Mather and Shuman attempted to explain the phenomena by assuming that two concurrent mechanisms were in operation:

Convulsive activity produces cellular

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† Mather, R. W., Schuman, C. R., and Harrison, S. I.: Influence of curare and eserine on ocular tension following electroshock. Am. J. Ophth., **37**: 859-866 (June) 1954.

‡ Ehrhardt, H.: Der intraokulare Druck im Electro-Shock. Deutsche Ztschr. f. Nervenh., **159**: 75-80, 1948.

hyperosmolarity by increasing the concentration of osmotically active particles within the cell; the permeability of the cell membrane is increased by liberated excess quantities of acetylcholine.

Mather and Shuman postulated that the hyperosmolarity and the increased membrane permeability resulted in the aqueous humor being withdrawn from the intercellular spaces into the intraocular capillaries, resulting in decreased ocular tension. They recognized that, in the interpretation of observations in a mechanism as complicated as this, other possible factors were probably involved.

Present study

Since their explanations were advanced as hypotheses, analyses of the ionic concentration of the aqueous humor of rabbits were undertaken by us in an effort to explain these most interesting variations of tension in otherwise normal eyes. The purpose of this study was to determine whether changes in ionic concentration sufficient to modify the osmotic pressure of the aqueous humor were demonstrable.

We confirmed (on rabbits) the observation of Mather and Shuman that ocular tension becomes markedly diminished shortly after convulsive dosages of electroshock. The animal results were similar to those reported for human beings, with decreases of 10 to 15 mm. Hg occurring immediately after shock, and a return to preshock tension levels in approximately 30 minutes. Curare was used in conjunction with electroshock; the absence of a decrease in tension, when this acetylcholine-blocking agent was used, also agreed with the human findings. The effect of drugs of the acetylcholine-inhibiting group was further demonstrated by the use of atropine in conjunction with electroshock. There was no decrease in the ocular tension of atropinized eyes following electroshock.

In each of the preceding experiments, bilateral paracenteses were performed in the following sequence:

The aqueous humor was withdrawn from one eye of the rabbit and the animal was

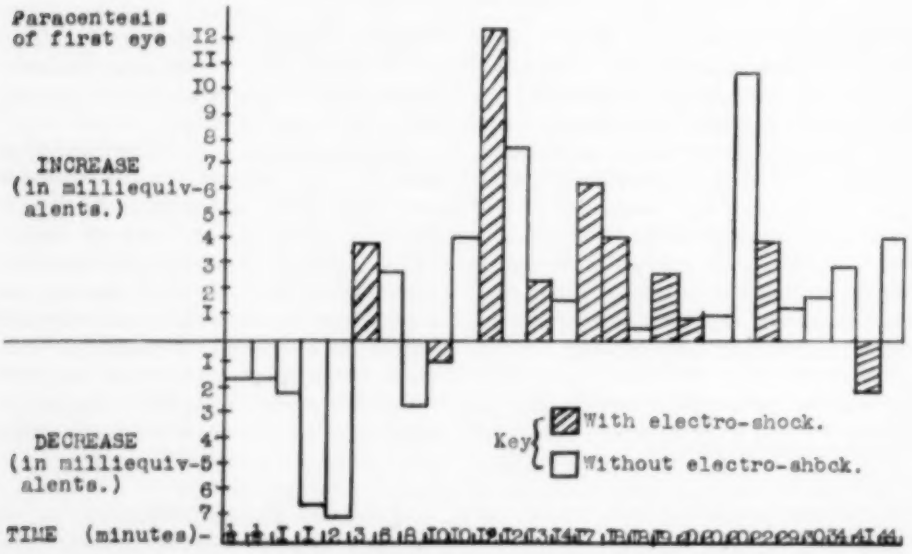

Fig. 1 (Sutliff and Hamilton). Variations in ionic concentration in the aqueous humor following contralateral paracentesis.

then subjected to electroshock of convulsive dosages. Paracentesis of the other eye of the same animal was then performed after a varying number of minutes following the first paracentesis. The aqueous humor samples were measured for changes in ion concentration. It was hoped that the degree to which the blood-aqueous barrier was involved in producing the decrease in ocular tension would be revealed.

In most of the cases in which electroshock was used in conjunction with paracentesis, the ion concentration in the aqueous fluid aspirated following the convulsive seizure showed a definite increase, making it evident that a control paracentesis would be necessary to determine if any change in ion concentration occurred without the electroshock and convulsion.

Changes in ion concentration in the aqueous humor aspirated from the second eye were found to occur without electroshock. Further investigation revealed that, as the time interval between the paracentesis of the first eye and the paracentesis of the second eye varied, the change in the ion concentration in the aqueous of the contralateral eye varied.

Ocular tensions were measured by electric tonometry using 0.5-percent pontocaine local anesthesia on adult albino rabbits.

A control experiment measuring tensions every two to five minutes for a 45 minute period resulted in a decrease of two mm. Hg. Ocular tensions were measured before and after electroshock administered by a brief stimulus therapy apparatus manufactured by Offner Electronics Laboratories.

Following convulsive seizures, averaging two minutes in duration, the ocular tension fell an average of 10 mm. Hg within five minutes after the shock was given, and returned to normal preshock readings within 45 minutes. Control tensions were measured to observe the effect of local ocular instillations of atropine, eserine, and systemically administered curare. No decrease in tension was noted without the electroshock.

Determination of ion concentration

Aqueous humor specimens were obtained by entering the anterior chamber with a 26-gauge needle and aspirating the contents of the anterior chamber as completely as possible. The resistance of the specimen of aqueous was determined by a 1,000-cycle A.C. conductivity bridge. Reproducibility of readings was one third of one percent of the values being measured. A solution of sodium chloride of known milliequivalent concentration approximately the same as normal aqueous humor was used as a standard and the resistance of this solution was determined for standardization. Thus results were obtained expressing the ionic concentration of the aqueous humor in terms of milliequivalents of sodium chloride per liter.

Determinations of changes in the ionic concentration of the aqueous humor were made in specimens obtained following electroshock alone and following electroshock used in conjunction with atropine, eserine, and curare.

The increase in ionic concentration in the aqueous humor following electroshock was approximately the same as in the controls (where paracentesis was performed without electroshock). Paracentesis alone may therefore be interpreted as the significant factor in causing the resulting change in ionic concentration in the aqueous humor in the second eye.

In 27 procedures, paracentesis was performed on the contralateral eye within a time interval varying from one-half minute to 44 minutes following paracentesis of the first eye in the same animal. The ionic concentration in each specimen of aqueous humor was determined and the result expressed in terms of milliequivalents of sodium chloride per liter.

The ionic concentration in the aqueous humor withdrawn from the first eye was then compared to the ionic concentration in the aqueous humor withdrawn from the contralateral eye in the same animal, and the difference in milliequivalent concentrations be-

tween the two specimens was noted.

In five separate procedures aspirations were made in the second eye within two minutes of the first. In all five cases the ionic concentration of fluid obtained by the second puncture decreased, the decrease varying from 1.5 milliequivalents at one-half minute to seven milliequivalents at two minutes. This finding suggests that immediately following paracentesis of the eye, the ion content of the aqueous humor of the contralateral eye rapidly becomes diluted.

Of 22 specimens of aqueous humor withdrawn from the second eye three to 44 minutes after aspiration of aqueous humor from the first eye, the ionic concentration in the aqueous humor from the second eye increased in 19 of the specimens. The increase varied from a minimum of eight-tenths milliequivalent to a maximum of 12 milliequivalents. The three remaining specimens decreased in ion concentration a minimum of one milliequivalent to a maximum of 2.7 milliequivalents.

Discussion

The ionic concentration increase in specimens of aqueous humor aspirated three or more minutes after paracentesis of the first eye suggests that, after the initial dilution (occurring in the aqueous-humor specimens aspirated within two minutes after the first paracentesis), the process reverses itself and the ionic concentration not only returns to the original level but actually increases.

The significance of the change in ionic concentration may be emphasized by the fact that in a completely dissociated solution of sodium chloride a change of one milliequivalent will result in an increase or decrease of 34 mm. Hg in the osmotic pressure when the solution is separated by a semipermeable membrane.

It is hazardous to conjecture which of the many possible mechanisms is responsible for these modifications in ionic concentration. Among the possibilities one may postulate that, immediately following paracentesis, some controlling mechanism inhibits the outflow of the aqueous humor in the eye which has not been subjected to paracentesis.

A simultaneous capillary dilatation might result in an outpouring of plasma contents by diffusion or filtration into the aqueous humor. The plasma contents, being hypotonic to the aqueous humor, would cause a dilution of the ionic content of the aqueous humor. Continuing this supposition the ionic concentration increases in the contralateral eye after a sufficient time interval, perhaps by hyperactive secretion of the ciliary body.

We believe that changes in ionic concentration in the aqueous humor sufficient to modify the osmotic pressure of the aqueous humor have been demonstrated by our procedures. The change in ionic concentration in the aqueous humor of the contralateral eye occurred following paracentesis of the first eye in conjunction with electroshock and following paracentesis alone. No mechanism for the change has been demonstrated.

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CAROTID-CAVERNOUS FISTULA SYNDROME*

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The serious threat to the vision and life of a patient presenting a carotid-cavernous fistula syndrome demands the immediate cognizance by the ophthalmologist and neurosurgeon of this dramatic and often fatal condition. Many of the cardinal factors to be considered in the diagnosis, prognosis, and treatment of this disorder are well illustrated by the case to be presented.

ETIOLOGY

For a long time the striking clinical picture resulting from a carotid-cavernous fistula has been recognized as the manifestation of a communication between the carotid artery and the cavernous sinus. About 75 percent of the occurrences are attributable to known trauma, as was our case, and the remaining 25 percent appear to have a spontaneous origin secondary to a vascular lesion.[1, 2] In Locke's[3] cases of pulsating exophthalmos, 77 percent were traumatic in origin, and, of these, 94 percent had a carotid-cavernous fistula. Head injuries, gunshot wounds, and so forth, are responsible for the traumatic type; sclerosis of the arterial wall with resultant weakness causes the spontaneous ones.[4]

CLINICAL PICTURE

Severe unilateral headache usually precedes the development of other signs and symptoms. It is characteristically localized to the side of the fistula and is soon followed by the onset of progressive exophthalmos. Since the ophthalmic veins drain into the cavernous sinus, a communication between it and the carotid artery results in stasis and engorgement of the retinal and retrobulbar veins due to the marked increase in the volume of blood entering this venous system. Exophthalmos, edema, and retinal hemorrhage follow.

Frequently the passage of arterial blood into the venous sinus produces a thrill or bruit which may be detected clinically and which is observed by the patient as a buzzing, sawing, or swishing sound within his head. The thrill or bruit may be transmitted into the neck but serves well to localize the side of the fistula. Manual compression of the involved carotid will diminish or obliterate this phenomenon.

A variable degree of ophthalmoplegia is almost always a part of the carotid-cavernous fistula syndrome, since the third, fourth, and sixth cranial nerves are located in or within the wall of the cavernous sinus. Sattler and others[5] say that 62 percent of cases show involvement of the sixth nerve, 23 percent of the third nerve and 10 percent of the fourth nerve.

Funduscopy reveals engorgement of the retinal veins of various degrees and occasionally a low-grade papilledema, as shown by Sugar and Meyer.[6] If the veins are not dilated the explanation lies in the fact that the inferior ophthalmic veins may drain into the pterygoid plexus rather than into the cavernous sinus. Sugar and Meyer[6] have also shown that long-standing obstruction of the venous drainage can result in glaucoma and eventual optic atrophy.

RADIOGRAPHIC FINDINGS

Erosion of the sella turcica, the sphenoid, or the orbital walls may be demonstrated on roentgenologic study,[7] but these changes are late ones and will not be seen in the

* From the Departments of Ophthalmology and Neurosurgery, Cook County Hospital, Chicago, Illinois.

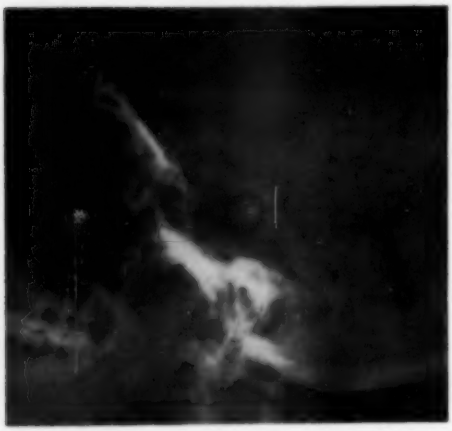

Fig. 1 (Abrahamson and Bell). Usual appearance of the skull in a patient with carotid-cavernous fistula syndrome.

rapidly developing acute case. By the use of arteriography[8] with a radiopaque substance such as Diodrast,® one may prove the existence of a fistula or aneurysm.

Figure 1 illustrates the usual appearance of the skull in a patient with this condition. In Figures 2 and 3, a large communicating aneurysm, occurring in the same patient, is well outlined by arteriography.

Prognosis

Alleviation of symptoms and arrest of the disease process will follow the formation of a thrombus which occludes the fistula. This may occur spontaneously and provide permanent remission, or may result in temporary relief with a recurrence at any time due to canalization. Such was the course of the case to be presented. Permanent arrest of the condition can, therefore, only be expected when the fistulous circuit has been surgically interrupted.

Therapy

Prior to any surgical intervention the competence of the uninvolved cerebral circulation should be evaluated in order to be assured that cerebral ischemia will not be produced by interrupting the blood flow to the fistula. Digital compression of the common carotid artery, on the involved side, against the tubercle of the sixth cervical vertebra may be carried out several times daily with increasing frequency and for progressively longer periods ranging from one to 45 minutes.[9]

In the absence of cerebral excitement or other untoward symptoms, it may be assumed that the contralateral carotid and the vertebral arteries will provide adequate cerebral circulation. Nevertheless, it is advisable to occlude the carotid by some means which will permit the blood flow to be readily resumed should the postoperative condition demand.

For this task a metallic clip fashioned from a strip of tantalum eight to 10 mm. in width and about 0.5 mm. thickness has proven most satisfactory. The clip may be easily closed over the carotid artery to obliterate its lumen permanently and completely but, since the resultant trauma to the vessel wall and its intima is slight, the continuity can be established instantane-

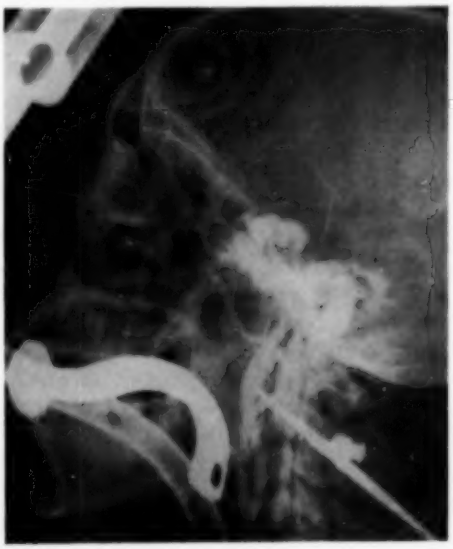

Fig. 2 (Abrahamson and Bell). Lateral arteriogram, showing a large communicating aneurysm.

ously by the simple removal of the clip, if this should be necessary.

It can scarcely be overemphasized that the development of any signs of cerebral anoxia following carotid ligation demands immediate release of the ligature. Consequently, it is mandatory that the procedure of carotid-artery ligation be carried out under local anesthesia with a minimal amount of sedation to assure the patient's active co-operation in the detection of subjective or objective signs of cerebral circulatory inadequacy.

In addition to close observation during the postoperative period, it is advisable to have at the patient's bedside a sterile tray containing the necessary instruments to permit re-opening of the surgical wound and removal of the ligature with a minimum of delay if indications should arise.

Surgical interruption of the flow to a carotid-cavernous fistula may be performed as a two-stage procedure to lessen the likelihood of cerebral complications by taking advantage of the collateral circulation that exists between the branches of the right and left external carotid arteries.

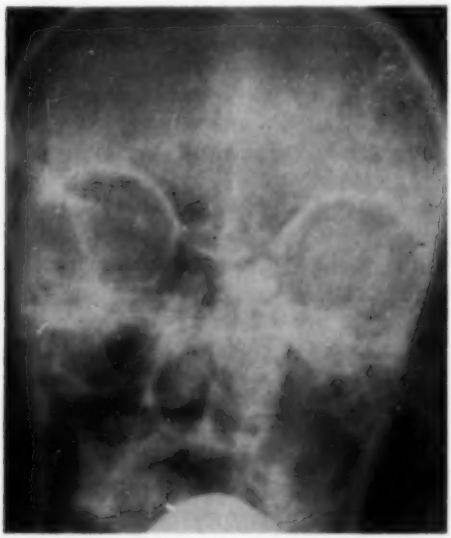

Fig. 3 (Abrahamson and Bell). Anteroposterior arteriogram, showing a large communicating aneurysm.

At the initial exposure of the common carotid artery, direct digital compression is applied for 10 to 20 minutes; if no contraindication is observed in that time, the vessel is ligated below its bifurcation. Thus, the direct cardiac impulse will no longer be transmitted to the fistula. However, blood from the external carotid artery of the normal side will induce a retrograde flow through the external carotid artery of the involved side into the involved internal carotid artery, thus maintaining some degree of circulation.

Spontaneous thrombosis of the fistula may follow this stage but freedom from potential recurrence can only be assured if, at a later date, this collateral circulatory pathway is eliminated by ligation of the involved internal carotid artery.

In an occasional case, ligation of the internal carotid artery may not be effective because of an existing collateral circulation through the ophthalmic artery; and ligation of the ophthalmic artery through an intracranial approach may be necessary to obtain the desired result.

Anticoagulant therapy should be initiated postoperatively to prevent the formation of retrograde thrombosis below the point of ligation. Bleeding from the operative wound can be eliminated by careful attention to hemostasis at the operating table and postoperative application of a snug dressing.

Case report

History. On March 10, 1953, a 28-year-old Negro was admitted with protrusion and congestion of the left eye, which had been of marked degree for six weeks. There was a history of having sustained a knife wound, in 1946, which involved the left side of the neck at the level of the fifth and sixth cervical vertebra.

A head injury had occurred on December 9, 1952, when the patient had been struck by a bowling pin. The patient stated that he had not lost consciousness at that

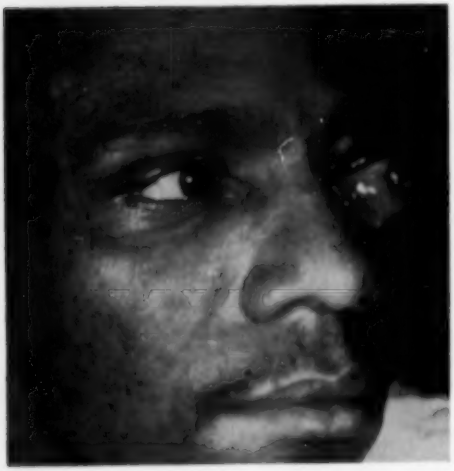

Fig. 4 (Abrahamson and Bell). Appearance of patient on first admission.

time, but that he had sustained a laceration over the right occipito-parietal region which had required suturing. Following this head injury, the patient was seen at a Detroit hospital where X-ray films of the skull and orbit were reported as negative.

For two months prior to admission he had noted redness and protrusion of the left eye which had progressively increased but had caused no pain. Three weeks prior to admission he had become aware of a "sawing" noise in the left side of his head.

Physical examination was essentially negative except that the left eye was markedly proptosed (fig. 4), tense, and congested, with lateral and downward displacement. There was no pulsation of the globe but there was marked injection of the sclera and conjunctiva with conjunctival chemosis. The left pupil was larger than the right, and both reacted to light.

Funduscopic examination, O.S., revealed a normal disc, tremendously dilated veins, but no hemorrrhages or exudates. Vision was: O.D., 20/20; O.S., 20/20. Tension was: 20 mm. Hg (Schiøtz), O.U. The tonometer sign described by Boyes and Ralph[10] was not elicited. Hertel exophthalmometer readings were: O.D., 21 mm.; O.S., 29 mm. base 110.

An audible bruit and a palpable thrill with systolic accentuation were detected over the left globe and the left side of the neck. Compression of the neck at the site of the old neck wound, and point of greatest intensity of the thrill, resulted in cessation of the subjective head noise.

Provisional diagnosis was a retrobulbar mass causing unilateral proptosis. Consideration was given to neoplasm (local or extension from the cranium), chronic inflammation (abscess, cellulitis, or pseudo-exophthalmos), aneurysm, and arteriovenous fistula of the carotid-cavernous sinus.

Consultation by the vascular surgeon led to the diagnosis of an arteriovenous fistula in the neck, between the carotid artery and the internal jugular vein. The neurosurgical consultant concurred in this diagnosis and recommended arteriography preparatory to exploration. Repeated determinations with the Hertel exophthalmometer during the four weeks following admission revealed: O.D., 22 mm.; O.S., 30 to 32 mm., base 105. With the development of severe conjunctival chemosis, accompanied by punctate keratitis, the patient received chloromycetin drops and ointment locally, and a Bullar shield to his left eye.

It is believed that clinical evidence had established the existence of arteriovenous fistula in the left side of the neck, below the mandible, at the site of an old knife wound. Accordingly, on April 6, 1953, surgical exploration of the neck was performed by the vascular surgeon, but no abnormality of the carotid vessels could be demonstrated. Subsequent arteriography was planned but the patient declined additional treatment and was not seen again for eight months. In the interim the patient had been free from subjective symptoms, but the chemosis and proptosis persisted.

Later admission. On January 3, 1954, the clinical picture became more pronounced and was accompanied by left hemicranial pain, chills, fever, prostration, profuse diaphoresis, repeated emesis, and more marked proptosis of the left globe. Systemic review, physical,

and neurologic examinations on January 7th were essentially negative with normal temperature, pulse, and blood pressure.

Vision was: O.D., 20/20; O.S., light perception and projection. The pupils reacted to light and accommodation. Severe chemosis of the conjunctiva and lids of the left eye prevented their closure with a resultant hazy and abraded cornea. The Hertel exophthalmometer reading was: O.D., 23 mm.; O.S., 40 mm., base 110.

On January 8th, the fundus could not be visualized. Vision, O.S., was light perception and faulty projection.

The neurosurgical consultant's opinion was that an intracranial arteriovenous fistula was producing the proptosis by engorgement of the orbital veins. Cerebral arteriography was recommended to verify this assumption; however, with the suspicion of a retrobulbar neoplasm, abscess, hemorrhage, or localized meningitis by the examining neuro-ophthalmologist, consideration was given to enucleation or retrobulbar exploration.

On January 11th, the exophthalmos was less marked and still no bruit could be detected. It was postulated that there had been a spontaneous thrombosis of an arteriovenous fistula and the patient was transferred to the neurosurgical service for arteriography.

Arteriography. The presence of a communicating aneurysm between the left internal carotid artery and the cavernous sinus was demonstrated on January 15th by open cerebral arteriography. This procedure was carried out under general anesthesia; using aseptic operative technique. A No. 18 gauge spinal needle was introduced into the lumen of the surgically exposed left internal carotid artery at its point of origin, and 10 cc. of a warm 40.5-percent solution of Diodrast® (Winthrop-Stearns) was injected forcefully at the time of exposure of both the anteroposterior and lateral radiographs.

An irregular mass posterior to the left globe was well outlined on the films (figs. 2 and 3). Following this procedure the patient stated that he was again aware of a swishing noise in his head and the bruit, which had spontaneously ceased during his hospitalization, was again audible. These observations were believed to indicate that arteriography had re-established the fistula following a second spontaneous thrombosis. Fortunately, there was no concomitant embolic phenomena.

Surgery. The first stage of the neurosurgical treatment was performed on January 29th under local anesthesia. The left common carotid artery was exposed below the level of its bifurcation, and digital compression was applied to occlude its lumen for 20 minutes. Since no evidence of intracranial circulatory embarrassment was detected, a tantalum clip was applied to the vessel at this level so as to obliterate its lumen completely. Anticoagulant therapy was initiated four hours postoperatively, 50 mg. of Heparin being given intravenously every four hours until a sufficiently low prothrombin time could be maintained by the administration of Hedulin.

The audible bruit and the subjective head noise were no longer present postoperatively and the proptosis was diminished. Daily improvement followed. By the fourth postoperative day the patient was able to count fingers with the left eye.

Examination two weeks after surgery revealed vision in the left eye to be 15/200. Tension was: O.D., 20 mm. Hg (Schiötz); O.S. 25 mm. Hg. There was good motility of the globe except in lateral duction.

Fundus examination through a hazy medium revealed retinal hemorrhages and venous dilatation. The proptosis had receded to 32 mm. on the Hertel scale, and the patient was able to close his eye by force.

At this time the common carotid artery was again exposed under local anesthesia and, following the same technique that had been previously employed, the left internal and external carotid arteries were digitally compressed and then occluded with tantalum clips. Anticoagulant therapy was resumed in the postoperative period. The patient was symptom-free following surgery and con-

Fig. 5 (Abrahamson and Bell). After surgery. The exophthalmos has decreased and the patient is able to close his eyes.

tinued to show daily recession of the proptosis and improvement in vision.

On the 10th postoperative day his vision was: O.D., 20/20; O.S., 20/100. Exophthalmos was 30 mm. on the Hertel scale and motility of the globe was improved. Although lid closure was almost complete, slight lagophthalmos still persisted. The cornea revealed dense opacities in the lower third, with mild keratitis present at the 6-o'clock position.

After dilatation, the fundus examination revealed the disc to be within physiologically normal limits, and numerous hemorrhages and exudates were seen throughout the retina. The condition remained unchanged during the next 10 days and the patient was discharged to be followed in the out-patient clinic.

On March 17, 1954, the following observations were noted: Vision was: O.S., 20/70; Hertel exophthalmometer: O.D., 22 mm.; O.S., 26 mm. The cornea was clear and good motility was present. The fundus showed marked improvement of the retinal hemorrhages and exudates. Figure 5 illustrates the diminution of exophthalmos and the ability of the patient to close his eyes.

The patient was last seen on June 9, 1954, with the findings very similar to those already noted. The retinal hemorrhages were no longer present but slight proptosis still persisted.

Summary

1. The seriousness of the sequelae resulting from a carotid-cavernous fistula demands prompt diagnosis so that effective therapeutic management can be initiated.

2. A discussion of the etiology, clinical picture, radiographic findings, prognosis, and therapy of this syndrome is presented.

3. A case illustrating the salient features of this syndrome has been reviewed.

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We wish to acknowledge our appreciation to Dr. Theodore N. Zekman and Dr. Milton Tinsley for their helpful advice in the preparation of this paper.

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A SCHOOL VISION HEALTH STUDY IN DANBURY, CONNECTICUT*

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Southbridge, Massachusetts

INTRODUCTION

The nature of the school vision screening process requires that relatively meager information be used to predict the outcomes of complete examinations by ophthalmologists and optometrists. At best, predictions of this kind are fallible and additional allowance must be made for chance error factors. In vision screening, therefore, it may be expected (a) that some children who need visual care may not be identified and referred for professional attention and (b) that others who do not need care may be selected and referred for professional attention. These are the errors of under-referral and errors of over-referral inherent in any health screening process. It is the intent of visual screening operations to minimize these kinds of error while dichotomizing the school population into those likely to need care and those not likely to need care.[6]

A questionnaire survey[7] has revealed considerable variation in professional opinion regarding (a) the visual characteristics and (b) the degree of deficiency in given visual characteristics which might distinguish effectively between children who should and children who should not be referred for complete eye examinations.

The demonstrated variability of opinion regarding school vision screening practices makes it especially desirable to determine by experiment the effectiveness of given screening routines in identifying the children whom ophthalmic practitioners find to be in need of visual care.

A number of reports on school vision screening tests and practices are available.[3, 5, 10–13] The study reported here is another effort to evaluate the effectiveness of a screening test and of some other school vision health practices.

THE MASSACHUSETTS VISION TEST

The Massachusetts Vision Test provides for the measurement of visual acuity, far sightedness (hypermetropia), and muscle balance (tropia or phoria). For each test used, a critical point or score is established to distinguish clearly between the passing and the failing performance. The failure of any test is considered sufficient evidence to justify the recommendation that a complete visual examination be arranged.

The development of the Massachusetts Vision Test has been described by Oak[9] and Sloane.[12] Since the test was designed solely for school vision screening, it has several characteristics which favor efficient operation. For example, the test routine is reduced to that considered necessary to distinguish effectively between the children who are and the children who are not to be referred for a complete examination; this reduction to minimum essentials appears necessary for practicable screening of millions of school children.

In addition, each test is made at the critical point of passing or failing; this eliminates the detailed measurement of visual functions which, although interesting, is not relevant to the purpose of screening as such. To facilitate the screening procedure further, the examination of a child is terminated when any test is failed and additional data are irrelevant to the decision to recommend

* From the Research Department of the American Optical Company. The school vision study reported here required the co-operation of many people. The author is especially indebted to Walter P. Sweet, superintendent of schools, and his staff for excellent cooperation and assistance in the testing program. A special note of appreciation is expressed to the ophthalmologists and optometrists in Danbury, and elsewhere, who completed and returned individual reports for more than 600 children. As a member of the staff, Mrs. Evelyn A. Backer, R.N., tested all the children and performed other tasks with competence and efficiency.

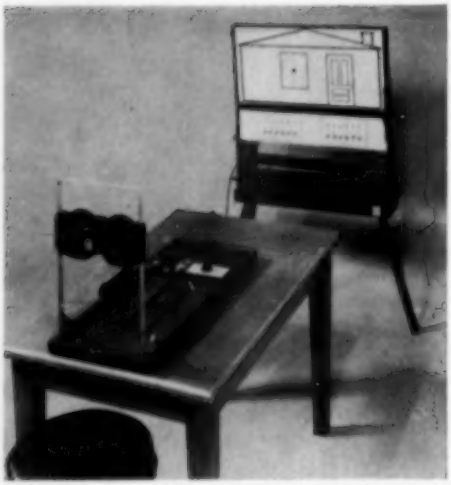


Plate 1 (Leverett). Instrument used in testing.

professional attention. It is of special interest, also, that the tests are simplified to the point where they can be administered with facility to very young school children.

Although the Massachusetts Vision Test has been used extensively and given an unusual degree of official approval,[1, 6, 7] there is, relatively speaking, a lack of detailed information on the functional effectiveness of the device. The present study is intended to contribute to the information on the usefulness of the test in school vision screening. It represents a part of a broader program which includes efforts to improve the efficiency of school vision screening through better instrument design and test routine.

The design of the experimental instrument shown in Plate 1 and various aspects of routine test operations in schools will be treated elsewhere. This report concerns primarily an evaluation of school vision screening practices as related to (1) the test performance of children who wear glasses and of children who do not have glasses, (2) the visual care status of children wearing glasses, and (3) the effectiveness of the test in identifying the children whom ophthalmologists and optometrists find to be in need of visual care.

Procedures

During 1951 and 1952, preliminary discussions were held with the superintendent of schools and various ophthalmic practitioners in Danbury, Connecticut. In February, 1952, there was a general meeting of the superintendent of schools and the ophthalmologists and optometrists practicing in Danbury. At this meeting, the entire program was outlined and plans were made to proceed with a study of the Massachusetts Vision Test and other school vision health practices during the following school year, 1952-1953.

Testing

To reduce the possible error factors in testing and to permit a better evaluation of the referral standards adopted, concerted efforts were made to elicit the optimal test performance from each child and to provide each child ample opportunity to meet the standards for passing the test. Proceeding on this basis, each child was tested carefully and, wherever practicable, those who failed the test were re-examined to provide a second opportunity to meet the test standards. In accordance with the Massachusetts Department of Public Health "Instructions for Massachusetts Vision Test,"[2] the children wearing glasses were tested through the lenses.

Standards for failure

Children were considered to have failed the test if:

1. Acuity at 20 feet was less than 20/20 for either the right or the left eye.

2. Acuity at 20 feet through plus sphere lenses (+1.75D. for grades 1 and 2, +1.5D. for grade 3 and above) was (a) 20/20 for either the right or left eye or (b) 20/30 for both the right and the left eyes.

3. Vertical phoria or tropia at 20 feet was greater than 1.25 prism diopters.

4. Lateral phoria or tropia was greater than 6.0 prism diapters "eso" or 4.0 prism diopters "exo" at 20 feet, or greater than 6.0 "eso" or 8.0 "exo" at 16 inches.

These standards were adopted in accordance with the then current (1952) practices of the Massachusetts Department of Public Health.[2] Following the completion of the basic work in the Danbury Study, committees appointed by the New England Ophthalmological Society, the Massachusetts Medical Society, the Harvard School of Public Health, and the Children's Medical Center made recommendations that the standards for referral be modified.[4] These recommendations favored lowering the standards for referral as follows:

Children in grades 1 through 3 would be failed if:

1. Acuity at 20 feet is less than 20/40 in either the right or left eye.
2. Acuity at 20 feet through +2.25 diopter spheres is 20/20 in either the right or left eye.

Although the phoria or tropia standards are not lowered, the application of the tests is considered optional for grades 1 through 3.

Children in grade 4 and above would be failed if:

1. Acuity at 20 feet is less than 20/30 in either the right or left eye.
2. Acuity at 20 feet through +1.75 diopter spheres is 20/20 for either the right or the left eye.

Phoria or tropia tests are included without change.

These standards for referral recommended by the New England committees are of great interest. The present study, however, was carried out using the higher standards already outlined.

Children wearing glasses

A preliminary tabulation of the test results for the children wearing glasses and for the children not wearing glasses indicated that there were marked differences between the groups. Under these circumstances, it seemed advisable to treat separately the data obtained for these two groups of children.

From the viewpoint of referrals for professional attention, also, it did not appear that the children wearing glasses should be tested and referred for a complete visual examination in the same manner as the children who were not known to be under care. Consequently, for children wearing corrections, the test results were disregarded and inquiries were made to ascertain the current visual care status. This procedure followed in a general way the pattern proposed by a joint committee of optometrists and ophthalmologists working with the Illinois Society for the Prevention of Blindness.[6]

Inquiries

Although the children wearing glasses were tested and the failures were retested, none was referred for professional attention as such. Letters were sent to the parents of all children wearing glasses requesting that an inquiry form be forwarded to the doctor who last examined the child's eyes. This inquiry form, which was to be returned by the doctor, requested basic information concerning vision, the desirability of a re-examination, and the like. When the doctor's report indicated that a re-examination was desirable, another letter was sent to the parents with this information. Figure 1 shows the letter to the parent; Figure 2, the inquiry addressed to the doctor; Figure 3, the notice concerning the desirability of a re-examination.

Referrals

Children not wearing glasses who failed both the test and the retest were considered in need of a complete visual examination. Accordingly, letters were sent to the parents recommending a complete examination and requesting that a form be delivered to the doctor at the time of the examination. The form, which was to be returned by the doctor, requested information concerning the child's vision, the need for visual care, diagnosis, treatment, and the like. Figure 4 shows the letter to the parent; Figure 5, the letter addressed to the doctor.

DANBURY, CONNECTICUT
DEPARTMENT OF PUBLIC SCHOOLS

WALTER P. SWEET

Dear

As part of the school health program and in cooperation with the Doctors, we are making a survey of the vision of the school children. We are attempting to get complete information concerning the vision of each child.

Since is wearing glasses, we should like very much to have the doctor who last examined the child's eyes complete the form which is attached to this letter.

We should appreciate it very much if you would present the attached form to the doctor who last examined your child's eyes.

Very truly yours,

Mrs. Evelyn A. Barker, R.N.

LP:mc

Approved: W P Sweet
Walter P. Sweet
Superintendent

Fig. 1 (Leverett). Letter to the parent.

Follow-up routine

Where reports on the referral or inquiry forms seemed to be unduly delayed, the nurse made appropriate inquiries by communicating with the children at school, calling the parents by telephone, or mailing a note to the home.

Test results

An effort was made to test all children in the public schools and in one large parochial school. The distribution of the children examined is shown in Table 1. It may be seen here that, among the 4,662 children tested, 575 or 12.3 percent wore glasses; 4,087 or 87.7 percent did not wear glasses. The proportion of children wearing glasses in each grade increases rather consistently from zero in kindergarten to 27.3 percent in grade 12. This trend through the grades is perhaps a function of both the increasing opportunity for the identification of visual deficiencies and the greater frequency of visual defects among the older children.

Children wearing glasses

Table 2 presents the outcomes of the vision testing for 575 children wearing glasses. In this group, we find that 321 or 55.8 percent fail; only 254 or 44.2 percent pass the screening test. Apparently a large proportion of these children do not meet the standards of the test despite the improved vision achieved with glasses.

The percentage of failures decreases from 71.7 percent in grades 1 through 3 to 44.9 percent for grades 10 through 12. This rather consistent decrease in the proportion of failures among children wearing glasses may reflect the influence of several factors. For example, there may be among the younger children wearing glasses a large proportion of

TABLE 1

CHILDREN TESTED

Grade	Total	Without Glasses		With Glasses	
		No.	%	No.	%
K	101	101	100.0	—	—
1	545	531	97.4	14	2.6
2	382	368	96.3	14	3.7
3	421	396	94.1	25	5.9
4	457	422	92.3	35	7.7
5	392	350	89.3	42	10.7
6	368	314	85.3	54	14.7
7	342	293	85.7	49	14.3
8	339	279	82.3	60	17.7
9	409	343	83.9	66	16.1
10	345	264	76.5	81	23.5
11	290	229	79.0	61	21.0
12	271	197	72.7	74	27.3
Totals	4,662	4,087	87.7	575	12.3

VISUAL HEALTH PROGRAM
Department of Public Schools
Danbury, Connecticut

Office in the Park Avenue School

Dear Doctor:

As a part of the school health program, a vision screening test is being given to all children. In conducting this program, however, we note that ____ is under your care.

In order to complete our records and to enable us to assist in caring for visual problems, we would appreciate very much your completing this form and returning it to Mrs. Dwight A. Bacher, R.N., Park Avenue School, Danbury, Connecticut. A return envelope is enclosed.

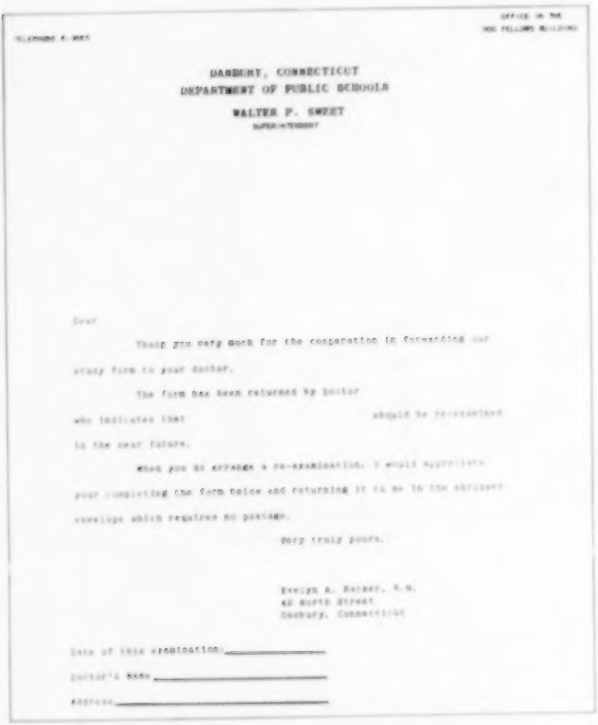
1. Date of last examination _____
2. Do you consider a re-examination desirable at this time? Yes____ No____
3. Was a re-examination arranged as a result of this inquiry? Yes____ No____
4. Please indicate the general nature of the treatment prescribed:
   a) _____ Correction.
   b) _____ Visual Training.
   c) _____ Other (please specify) _____
5. Diagnosis: Refractive Error____; Phoria____; Tropia____; No Defects____.
6. Prognosis _____
7. What is the expected acuity at twenty feet?
   a) Without Correction.. OD_____ OS_____ OU_____
   b) With Correction..... OD_____ OS_____ OU_____
8. What is the expected acuity at near?
   a) Without Correction.. OD_____ OS_____ OU_____
   b) With Correction..... OD_____ OS_____ OU_____
9. Please indicate any steps to be taken to aid vision:
   At School: _____
   At Home: _____
10. Please indicate instructions regarding the wearing of corrections, etc.: _____
11. Comments: _____

Signed: _____
Address: _____
Date: _____

(2-52)

FORM NO. 803 Bureau of Visual Science
American Optical Company

Fig. 2 (Leverett). Inquiry addressed to the doctor.



DANBURY, CONNECTICUT
DEPARTMENT OF PUBLIC SCHOOLS
WALTER P. SWEET

Dear

Thank you very much for the cooperation in forwarding our study form to your doctor.

The form has been returned by doctor who indicates that should be re-examined in the near future.

When you do arrange a re-examination, I would appreciate your completing the form below and returning it to me in the enclosed envelope which requires no postage.

Very truly yours,

Evelyn A. Bachert, R.N.
48 North Street
Danbury, Connecticut

Date of this examination:_____
Doctor's Name_____
Address_____

Fig. 3 (Leverett). Notice of desirability of re-examination.

those easily detected severe visual deficiencies which can be ameliorated but not improved to the level of the test standards.

In the later grades, more children with moderate defects may be included in the group wearing glasses and, for a larger proportion of these children, vision can be—when desirable—improved to the level of the test standards. On the other hand, the trend might be accounted for in part by a maturity factor. If the young children are slow to adjust to the test situation and to demonstrate optimal test performance, they would tend to show a higher failure rate than the older children on the first test at least.

Whatever factors account for the trend in Table 2, it is clear that among those wearing glasses only 28.3 percent in grades 1 through

TABLE 2

TEST RESULTS FOR CHILDREN WEARING GLASSES

Grade	No.	Passed		Failed	
		No.	%	No.	%
1– 3	53	15	28.3	38	71.7
4– 6	131	44	33.6	87	66.4
7– 9	175	76	43.4	99	56.6
10–12	216	119	55.1	97	44.9
Totals	575	254	44.2	321	55.8

DANBURY, CONNECTICUT
DEPARTMENT OF PUBLIC SCHOOLS

WALTER P. SWEET

Dear

As part of the school health program, a vision screening test was given recently to your child.

The results shown by this test were not entirely satisfactory.

We recommend that all children who fail the test have a complete eye examination. When you see the eye doctor, please give him the papers that are attached to this letter.

Very truly yours,

Mrs. Evelyn A. Bacher, R.N.

LP:r

Approved: W P Sweet
Walter P. Sweet
Superintendent

Fig. 4 (Leverett). Letter to parent, recommending eye examination.

3 pass and the proportion passing increases with grade level to 55.1 percent in grades 10 through 12. The consistency of the trend and the magnitude of the change with grade level would suggest that the children wearing glasses are not homogeneous, that the nature of the group changes with grade level.

The retest results for 282 of the 321 failures are shown in Table 3. Here it may be seen that 55 or 19.5 percent changed test performance from fail to pass while 227 or 80.5 percent failed again. Among the children wearing glasses who fail the first test, about one in five passes the retest and about four in five fail the retest. The proportion changing test performance from fail to pass on retest varies from 28.1 percent for grades 1 through 3 to 10.0 percent for grades 10 through 12. The greater frequency of change from fail to pass among the younger children compared to that among the older children would seem to support the consideration that maturity influences the consistency of vision test performance.

TABLE 3

RETEST OF FAILURES AMONG CHILDREN WEARING GLASSES

Grade	No.	Passed		Failed	
		No.	%	No.	%
1– 3	32	9	28.1	23	71.9
4– 6	67	17	25.4	50	74.6
7– 9	93	20	21.5	73	78.5
10–12	90	9	10.0	81	90.0
Totals	282	55	19.5	227	80.5

VISUAL HEALTH PROGRAM
Department of Public Schools
Danbury, Connecticut

Office in the
Park Avenue School

Dear Doctor:

was given a visual screening examination at the school. The performance was not satisfactory. In order to complete our records and to enable us to assist in caring for visual problems, we would appreciate very much your completing this form and returning it to Mrs. Evelyn A. Becker, R.N., Park Avenue School, Danbury, Connecticut. A return envelope is enclosed.

1. Did your examination reveal a need for some visual care? Yes____ No____.
   If answer is "No," please check the following:
   a) was the complete eye examination desirable at this time? Yes____ No____.
   b) were any signs of visual deficiency detected? Yes____ No____.
2. Please indicate the general nature of the treatment, if any.
   a)____ Correction Prescribed.
   b)____ Visual Training Prescribed.
   c)____ Other (please specify)____
3. Diagnosis: Refractive Error____; Phoria____; Tropia____; No Defects____.
4. Prognosis: ____
5. What is the expected acuity at twenty feet?
   a) without Correction.. OD____ OS____ OU____.
   b) with Correction .... OD____ OS____ OU____.
6. What is the expected acuity at near?
   a) without Correction.. OD____ OS____ OU____.
   b) with Correction.... OD____ OS____ OU____.
7. Please indicate any steps to be taken to aid vision:
   At School: ____
   At Home: ____
8. Please indicate instructions regarding the wearing of corrections, etc: ____
9. The referral of this child is considered (please check):
   a)____ Fully warranted—examination revealed a need for visual care.
   b)____ Very appropriate — some professional attention was indicated, although visual care was not prescribed at this time.
   c)____ A complete examination revealed no visual deficiency.
10. Comments: ____

Signed: ____

Address: ____

Date: ____

Form No. 504 BUREAU OF VISUAL SCIENCE
AMERICAN OPTICAL COMPANY

Fig. 5 (Leverett). Letter to doctor asking results of examination.

The products of the percent failure on the first test (table 2) and the corresponding percent failure on retest (table 3) yield the following estimated proportions of failure on both test and retest for children wearing glasses:

Grades	Percent Failure Test and Retest
1— 3	51.6
4— 6	49.5
7— 9	44.4
10—12	40.4
K-12	44.9

In this form the trend toward a larger percentage of failure in the lower grades remains. If it could be assumed that retesting compensates fully for the maturity factor in test behavior, it might be suggested that variation in the failure rate for both test and retest is due to the relative degrees of deficiency under care at various grade levels. Generally, the data seem to indicate that both maturity and the degree of visual defect are factors to be considered in the relationship between failure rate and grade level for children wearing glasses.

Apart from the interesting variations with grade level, the test results for children wearing glasses may be summarized as follows: 55.8 percent fail the test; about 45 percent fail both test and retest. Despite improved vision made possible by lenses, a large proportion of children wearing glasses are unable to meet the screening test standards used

TABLE 4

TEST RESULTS FOR CHILDREN NOT WEARING GLASSES

Grade	No.	Passed		Failed	
		No.	%	No.	%
K– 3	1,396	1,092	78.2	304	21.8
4– 6	1,086	878	80.8	208	19.2
7– 9	915	712	77.8	203	22.2
10–12	690	572	82.9	118	17.1
Totals	4,087	3,254	79.6	833	20.4

in this study. Upon careful consideration, this is not surprising. Among children wearing glasses are some with deficiencies which cannot be corrected to the level of the test requirements, others with deficiencies such that correction to the level of test requirements is not desirable. These and other factors could account for the rather large proportion of failures on the screening test.

CHILDREN NOT WEARING GLASSES

The test results for 4,087 children who did not have glasses are shown in Table 4. It may be seen that for the group as a whole, 3,254 or 79.6 percent passed, 833 or 20.4 percent failed. In contrast to the data obtained for children wearing glasses, there are no marked or consistent trends of change in the failure rate with grade level.

Of the 833 failures, 730 were retested. Table 5 shows that 311 or 42.6 percent passed, 419 or 57.4 percent failed again. Like the data obtained for children wearing glasses, there are marked variations with grade level on retest. In the kindergarten through grade 3 group, 52.6 percent change from fail to pass on retest. The proportion changing in this manner decreases rather consistently to 26.7 percent for grades 10 through 12.

The products of the percent failure on the first test (table 4) and the corresponding percent failure on the retest (table 5) yield the following estimates of the proportions failing both test and retest:

GRADES	PERCENT FAILURE TEST AND RETEST
K— 3	10.3
4— 6	11.0
7— 9	14.1
10—12	12.5
K-12	11.7

In this form, the failure rate for both test and retest becomes 11.7 percent for children who do not have glasses. Variations with grade level are not large or consistent.

In discussing the test data for children wearing glasses, it was suggested that factors like the nature of the group wearing corrections, the severity of visual defects, and maturity in test behavior might account for some of the variations with grade level.

TABLE 5

RETEST OF FAILURES AMONG CHILDREN NOT WEARING GLASSES

Grade	No.	Passed		Failed	
		No.	%	No.	%
K– 3	268	141	52.6	127	47.4
4– 6	188	80	42.6	108	57.4
7– 9	173	63	36.4	110	63.6
10–12	101	27	26.7	74	73.3
Totals	730	311	42.6	419	57.4

Similar theoretic considerations can be suggested for the children who do not have glasses. For example, the expected increase in the proportion of failures in the upper grades may not become evident in Table 4 because some children with visual defects have received treatment and are, therefore, shown in the group wearing glasses (table 2). Furthermore, any residual trend toward a higher failure rate in the upper grades may not become evident because a maturity factor has an inverse effect tending to produce a higher failure rate in the lower grades. The interplay of these and other influences would appear to have eliminated any marked trends of change by grade on the first test for the children who do not have glasses.

The retest data in Table 5 indicate that the younger children change performance from fail to pass on retest more frequently than the older children. This would seem to support the consideration that immaturity tends to raise the failure rate for the early grades on the first test. Despite this, the percent of failure for both test and retest which makes some adjustment for the maturity factor does not bring out clearly a trend toward increased frequency of failure in the upper grades.

These theoretic considerations are suggested by the data presented here. Further research is needed to clarify the relationships of age and grade levels to vision test performance.

Summary of test results

Testing 4,662 school children from kindergarten through grade 12 and retesting those who failed, it was found that:

1. For the children wearing glasses, 55.8 percent fail the test; about 45 percent fail both test and retest.

2. For the children who do not have glasses, 20.4 percent fail the test; about 12 percent fail both test and retest.

3. For all children, 24.8 percent fail the test; about 16 percent fail both test and retest.

4. The 9.0 percent of all children changing performance from fail to pass on retest includes 10.9 percent of the children wearing glasses and 8.7 percent of the children who do not wear glasses.

5. The test results obtained for children wearing glasses differ greatly from those obtained for children who do not have glasses. The outstanding points of difference are in (a) test failure rate, (b) rate of change from fail to pass on retest, (c) variations of failure rate with grade.

Implications of test data

1. The relatively poor screening test performance of children wearing glasses when compared with that of children who do not have glasses seems to indicate that:

   a. Despite the improved vision attained through the use of lenses, many children wearing glasses are unable to meet school vision screening test standards.

   b. It is unwise to assume that all children who have received visual care have no residual visual handicap.

2. The variability of visual performance demonstrated in the retest data for children failing the first test seems to indicate that:

   a. The effectiveness of given standards of referral in school vision screening is, at least in part, dependent upon the precision with which vision can be measured in the school situation.

   b. If children failing the first test but passing the retest could be assumed to include many of those likely to be classed as over-referrals, the practice of retesting failures would appear to be fully justified.

Although the implications of the test results are deserving of more detailed treatment, it is necessary at this time to proceed with other phases of the visual health program undertaken in Danbury. Specifically, it is desirable to describe, partially at least, the supplementary information gathered to determine the visual care status of children

TABLE 6

INQUIRIES

Grade	Letters Mailed	Reports Returned	
		No.	%
1– 3	55	36	65.5
4– 6	139	90	64.7
7– 9	191	114	59.7
10–12	226	119	52.7
Totals	611	359	58.8

wearing glasses and to evaluate the adequacy of the referrals made among the children who did not have glasses. Evidence concerning the children wearing glasses is presented under "Inquiries and Reports." The evidence concerning the children referred for professional attention is presented under "Referrals and Reports."

INQUIRIES AND REPORTS

The inquiry forms shown in Figures 1 and 2 were mailed for the children tested with glasses and others who reported glasses lost or broken. The number of inquiries mailed, as well as the number and the percent of the reports returned by the doctors, are shown in Table 6. Of the 611 forms distributed, 359 or 58.8 percent were returned. A trend toward fewer reports in the upper grades seems to be rather consistent for the groups shown. The highest proportion of reports, 65.5 percent, appears for grades 1 through 3; the proportion returned decreases to 52.7 percent for grades 10 through 12.

In an effort to obtain estimates of the age of the prescriptions for the glasses worn by school children, the inquiry form included an item on the date of the last examination. Unfortunately, it was not clear that the date desired was the one for the examination which preceded the inquiry. In many instances, the date reported was that of the examination arranged following the inquiry letter.

The dates of last examination which appeared in 357 of the 359 reports were as follows:

	No.	%
Prior to Sept. 1, 1948	8	2.2
Sept. 1, 1948-Aug. 31, 1949	2	0.6
Sept. 1, 1949-Aug. 31, 1950	9	2.5
Sept. 1, 1950-Aug. 31, 1951	23	6.4
Sept. 1, 1951—Aug. 31, 1952	128	35.9
After Sept. 1, 1952	187	52.4
TOTALS	357	100.0

These can be considered as last examination dates following the inquiry letters (figs. 1 and 2), but preceding the letters which transmitted the doctors' reports that a re-examination was desirable (fig. 3). More than half (52.4 percent) of the children received examinations during the year in which the study was operating; 35.9 percent, during the previous year. About 12 percent of the children had not been examined in this two-year period.

Among the 359 reports there were 338 answers to the question:

"Do you consider a re-examination desirable at this time?"

For 145 or 42.9 percent, the response was "Yes"; for 193 or 57.1 percent, "No."

Thus, 42.9 percent of the children were considered due for a re-examination.

With this information, it is of interest to consider how many re-examinations occurred as a result of the inquiry alone. To the question "Was a re-examination arranged as a result of this inquiry?" there were 299 answers—88 or 29.4 percent were "Yes"; 211 or 70.6 percent "No."

It would appear, therefore, that the inquiry form functioned as an effective reminder of the need for a visit to the ophthalmologist or optometrist; 29.4 percent of the replies indicated that a re-examination was arranged following the inquiry.

Although the 29.4 percent arranging a re-examination is less than the 42.9 percent for whom the doctors considered a re-examination desirable, the inquiries led to significant action for a large number of children. Unfortunately, there was no detailed follow-up for the reminder forms (fig. 3) wherein the doctors' suggestion on the need for a re-

examination was transmitted to the parent. This kind of follow-up would appear necessary to determine the full effectiveness of the inquiry routine followed.

Since a large number of re-examinations were obtained as a result of the inquiries, the last examination dates for those wearing glasses cannot be interpreted as planned. This difficulty may be reflected also in the responses to other questions. It is of interest, however, to summarize the responses to the major questions concerning the children wearing glasses:

1. Following the inquiries, 88.3 percent of the reports indicated that the children wearing glasses had been examined within a two-year period.

2. The doctors' replies indicated that re-examinations were desirable for 42.9 percent of the group.

3. For 29.4 percent, it was reported that re-examinations were arranged as a result of the inquiries.

Referrals and Reports

The referral forms, Figures 4 and 5, were mailed for 501 children. Table 7 shows that 259 or 51.7 percent of the reports were returned by the doctors. Relatively little variation appears in the proportion of reports returned at different grade levels.

Of primary importance in the evaluation of any visual health screening procedure is the extent to which the ophthalmic practitioners find the children referred to be in need of visual care. The responses to the basic question concerning the need for visual care

TABLE 7

Referrals

Grade	Letters Mailed	Reports Returned	
		No.	%
K– 3	158	86	54.4
4– 6	125	60	48.0
7– 9	133	67	50.4
10–12	85	46	54.1
Totals	501	259	51.7

TABLE 8

Responses to the question: "Did your examination reveal a need for visual care?"

Grade	Number of Replies	Percent "Yes"	Percent "No"
K– 3	86	61.6	38.4
4– 6	59	79.7	20.3
7– 9	67	80.6	19.4
10–12	45	75.6	24.4
Totals	257	73.2	26.8

are shown in Table 8. The 257 replies to this question indicate that 73.2 percent of the children were found to need visual care; 26.8 percent were found not to need visual care. The lowest proportion found to need care appears for the kindergarten through grade 3 group where the responses are 61.6 percent "Yes" and 38.4 percent "No." The other three grade level groups show responses which are 75 to 80 percent "Yes" and 20 to 25 percent "No."

In the absence of more detailed information, it is assumed frequently that children referred and found not to be in need of visual care must be classed as errors of over-referral. To obtain some information concerning the visual condition of the referrals for whom the question on the need for care was answered negatively, two additional questions were asked.

The question and answers for the 69 children reported as not needing care (26.8 percent "No," table 8) were as follows:

a. "Was the complete eye examination desirable at this time?"

   65 replies:
   80.0 percent "Yes"
   20.0 percent "No"

b. "Were any signs of visual deficiency detected?"

   62 replies:
   69.4 percent "Yes"
   30.6 percent "No"

It follows from these data that the eye examination was considered desirable for

80 percent of the referrals found not to need visual care. Likewise, signs of visual deficiency were detected in 69 percent of the referrals found not to need visual care.

The interrelationship between the data in Table 8 and the replies to the two questions above are of considerable interest. If we take the products of the 20.0 percent "No" for question (a) and the 26.8 percent "No" in Table 8, it may be estimated that, for all referrals, only 5.4 percent were considered by the doctors as requiring neither visual care nor a complete eye examination. Combining likewise the 30.6 percent "No" for question (b) and the same 26.8 percent "No" in Table 8, it may be estimated that only 8.8 percent of all referrals were considered by the doctors as neither requiring care nor showing any sign of visual deficiency.

It is perhaps difficult in the light of these findings to establish very exact criteria for errors of over-referral. In a strict sense, only 73.2 percent of the referrals were found to need visual care; the remaining 26.8 percent of the referrals might, therefore, be considered erroneous. On the other hand, there is evidence that, among the children found not to need care, there are many for whom professional attention is desirable. Only 5.0 to 9.0 percent of the referrals appear to be wholly in error. In health screening operations, this would appear to be a very favorable outcome.

One of the last items in the report form provided for a rating of a referral as fully warranted, very appropriate, or unnecessary. The 241 of the possible 259 responses duplicated, for all practical purposes, the results obtained for the questions at the beginning of the report form. The ratings were distributed as follows:

	No.	*%*
Visual care needed	173	71.8
Professional attention indicated	55	22.8
No visual deficiency	13	5.4
TOTAL	241	100.0

These data indicate that about 72 percent of the referrals were correct and that 5.0 percent were errors of over-referral. The remaining 23 percent do not seem to merit classification as either correct referrals or errors of over-referral. If one adopts as the criterion of a correct referral, the immediate need for visual care in the form of a correction, training or surgery, the group would be considered as errors of over-referral. On the other hand, if one adopts as a criterion of a correct referral, the desirability of professional attention or supervision, whether or not immediate treatment is undertaken, the group would be considered as correct referrals.

The criterion adopted will make a difference in the statistics. From the viewpoint of the immediate need for visual care, 72 percent of the referrals were correct; 28 percent, in error. From the viewpoint of the doctors' opinions concerning the need for professional attention, 95 percent of the referrals were correct; 5.0 percent, in error.

SUMMARY

1. As part of a broad program to evaluate various school vision health practices, a special study was carried out in Danbury, Connecticut.

2. A new experimental model of the Massachusetts Vision Test was administered to school children from kindergarten through grade 12.

3. The screening test results are presented separately for the children wearing glasses and for those who do not have glasses. Differences between the two groups of children are reviewed with respect to the failure rate and the variations in failure rate by grade level. Some implications of the test data are discussed briefly.

4. The children wearing glasses and failing the screening test were not referred for professional attention in the usual manner. Instead, inquiries were made to ascertain the visual care status of all children wearing glasses or otherwise known to be under care. The doctors' reports concerning the date of

last examination, the need for a re-examination, and the like, are presented to indicate the potential effectiveness of the inquiry procedure.

5. Children failing the screening test and not known to be under professional care were referred for a complete visual examination. The doctors' reports concerning the need for visual care, the adequacy of the referrals, and the like, are presented to indicate the effectiveness of the screening test in identifying the children whom the practitioners find to be in need of professional attention.

American Optical Company.

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CHANGE IN THE CONSTITUTION WITH AGE*

ITS INFLUENCE ON THE CLINICAL SYMPTOMS OF CONJUNCTIVITIS

YUKIHIKO MITSUI, M.D., CHIE TANAKA, M.D., AND KIICHI YAMASHITA, M.D.

Kumamoto, Japan

Our initial interest stemmed from the fact that in Japan there has been an epidemic of membranous conjunctivitis with systemic symptoms for about 20 years. During the period from July, 1943, to January, 1944, one of us (Y. M.) with Kudō observed 58 such cases in Hakodate-City.[1]

Among the systemic complications were high fever (in 24 cases over 38°C.), angina, pharyngitis or otitis media (in 42 of the 58 cases), and such dyspeptic symptoms as diarrhea and vomiting (in 19 cases). The bacteriology, with inclusion as well, was negative. Monocytes predominated in the discharge. The nature of the conjunctivitis was, however, obscure at that time.

During the following three years, Mitsui carefully examined all cases of membrane

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conjunctivitis in Kumamoto. Among 97 cases observed, 76 cases were considered to belong to this type of infection, while others were found to be of bacterial nature or inclusion conjunctivitis. The conjunctivitis of this type was seen exclusively in young children.

In 16 of the 76 cases, the epidemiology as a family transmission was confirmed.

In adult cases the conjunctivitis looked like acute follicular and there was often an association of punctate keratitis and preauricular adenopathy, which was entirely absent in infants. In smears, scrapings, and cultures, infectious germs, as well as inclusions, were negative. Monocytes were predominant in the smear.

The findings corresponded to those of epidemic keratoconjunctivitis. It was decided, therefore, to follow the relationship between epidemic keratoconjunctivitis and infantile membrane conjunctivitis of this type.[2]

A cross inoculation was performed:

Five adult volunteers were successfully inoculated with material from infantile membrane conjunctivitis, and three infant volunteers, nine to 14 months of age, were inoculated with material from adult epidemic keratoconjunctivitis.

In adult volunteers, the inoculation resulted in an onset of acute follicular conjunctivitis with preauricular adenopathy after an incubation period of four to seven days. Monocytes were predominant in the discharge. Bacteria and inclusions were negative. Systemic symptoms were negative. There was development of typical punctate keratitis of Fuchs' type in three cases.

In infant cases, the clinical appearance was that of membranous conjunctivitis and there was an association of obvious systemic symptoms in all cases. Mitsui concluded, therefore, that the membrane conjunctivitis with systemic symptoms which was widespread in Japan was an infantile form of epidemic keratoconjunctivitis. The finding was later confirmed by Aoki[3] and Mori.[4]

The entirely different clinical picture between the infection in infants and that in adults was also observed in trachoma[5] and in conjunctivitis due to Hemophilus conjunctivae.[6] Thus a change in the constitution with age, with special reference to the clinical symptoms of conjunctivitis, warranted attention and was, therefore, studied as follows.

Clinical study[7]

Epidemic keratoconjunctivitis was selected as the subject. The diagnosis was certain when punctate keratitis followed. In cases with no keratitis, diagnosis was verified by the following findings:

1. Acute follicular or membranous appearance of the conjunctivitis.
2. Monocyte predominance in a smear with essentially negative bacteriology.
3. Negative inclusions in scrapings.
4. Protracted incubation period as suggested by a wide interval between the onset of the disease in the first and the second eye.

A preauricular adenopathy, if presented, was also considered of diagnostic significance. The epidemiology was followed for reference.

From January, 1948, to December, 1949, 215 cases of this condition were examined. In each of these cases the symptoms were analyzed in accordance with the standard: degree of membrane formation, systemic symptoms, follicle formation, preauricular adenopathy, and punctate keratitis. Each symptom was graded severe, moderate, mild, and negative.

The total number of cases were divided into 11 age groups as indicated in Figure 1. In each group, the coefficient of each reactivity was calculated with the formula:

$$\frac{3A + 2B + C}{A + B + C + D} = \text{Coefficient of reactivity}$$

Where A, B, C, and D are the number of cases with severe, moderate, mild, or negative symptoms, respectively.

The degree of membrane formation indicates the degree of the fibrin-exudation re-

activity of the conjunctiva infected with epidemic keratoconjunctivitis. Likewise the degree of other symptoms indicates the degree of systemic reactivity, follicle-forming reactivity, preauricular-node reactivity, and corneal reactivity. Thus an "age curve of reactivity" was obtained with each reaction (fig. 1).

It is obvious from Figure 1, that the fibrin reaction is extremely strong in the newborn and in infants. It begins to decrease abruptly, however, in the two-year to five-year age period and it reaches its minimum in the 15-year to 40-year age period. It increases again, however, in the age period over 40 or 50 years. The age curve of the systemic reaction shows a similar course.

The nursing infant less than two months old seems to be incapable of forming follicles. The follicle reaction appears suddenly about this age. It increases rapidly in the following two years and reaches its apex by the age of five to 10 years. Then it begins to decrease slowly and the tendency to decrease persists for life.

The preauricular node reaction shows a similar course, except that the age at which this reaction appears and the age of greatest reactivity are more advanced. Although the age curve of the corneal reaction is similar to the curves of the other two reactions, here again there is a shift toward an older age group.

It will be noted that the curves of the reactivities in Figure 1 are both concave and convex: the concave show the course of the fibrin and systemic reactions through life; the convex, the life course of follicle, preauricular and keratic reactivity. It is interesting to note that, in each case, the constitution of the infant and that of the aged have some general tendencies in common.

Experimental study[7]

Fibrin reaction

The clinical study showed that the fibrin reaction of the conjunctiva against the epidemic keratoconjunctivitis virus showed a concave curve through life. To corroborate this and to learn whether other parts of the body would show the same tendency against other kinds of stimuli, the following

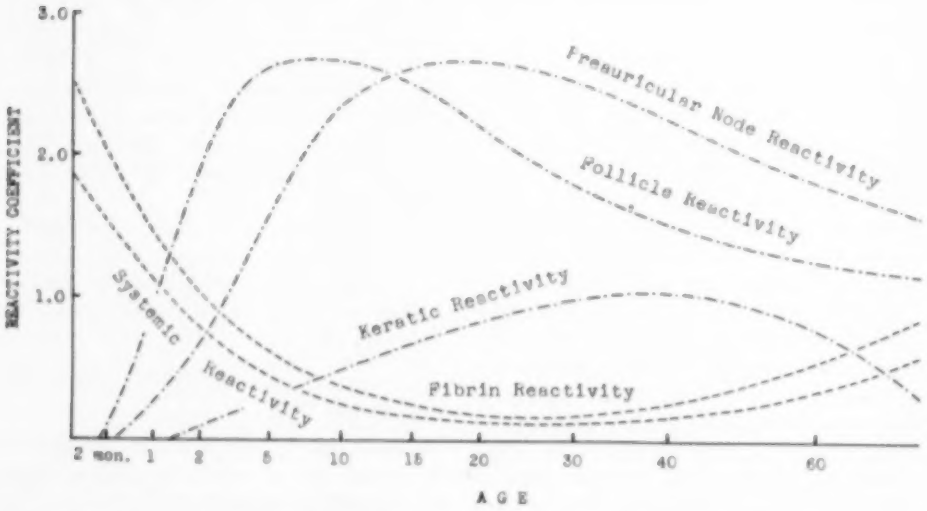

Fig. 1 (Mitsui, Tanaka, and Yamashita). Age curve of fibrin reactivity, systemic reactivity, follicle reactivity, preauricular node reactivity and keratic reactivity.

experiment was designed:

Sixty-seven patients were selected at random and divided into age groups. A cantharidin-ointment was smeared on a disk of linen cloth, 10 mm. in diameter and 2.0 mm. thick, and applied to the skin of the middle of the front forearm. After 24 hours, the wall of the vesicle formed by the cantharidin was cut with scissors and the contents were collected in a glass tube. A puncture method was not used because the main part of the fibrinogen in the exudate had changed by this time into a flocculent fibrin mass.

The volume of the exudate was measured first. Then to the exudate 30 times its volume of distilled water and two drops of 2.5-percent $CaCl_2$ solution were added. The mixture was held for one hour at room temperature to insure a total change of fibrinogen into fibrin. The fibrin mass was taken out with a gentle stirring motion of a glass rod and then pressed on filter papers. It was then held in a CaO desiccator until its weight was constant. Then it was weighed with an analytical balance.

The dried fibrin contained about 10 percent water as shown by a chemical analysis by Kjeldahl's method. A correction was then necessary to get the true weight of fibrin. Total fibrin weight divided by the exudate volume gave the fibrin concentration in the exudate. The concentration of other proteins was measured with the Esbach method using defibrinated exudate.

As seen in Figure 2, total fibrin and fibrin concentration in the exudate are extremely high in the zero-year to five-year age group. As the age advances, it decreases rapidly and becomes least in the 20-year to 40-year age group. It seems, however, to have a tendency to increase in the age groups over 40 to 50 years.

The fibrin concentration in the exudate can have a high level, as high as eight times that of the blood plasma (two to three mg./ml.). However, the concentration of other proteins in the exudate maintains, regardless of age, the same level as in blood plasma.

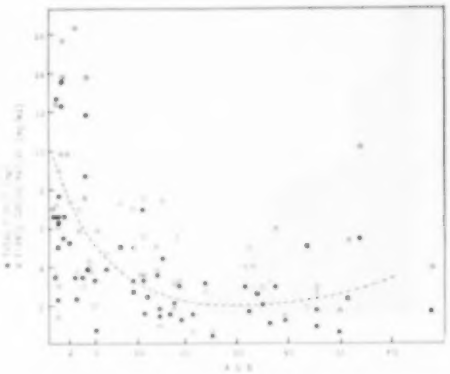

Fig. 2 (Mitsui, Tanaka, and Yamashita). Total fibrin content and fibrin concentration in cantharidin exudate, represented by black and white symbols respectively. Each symbol represents one person. Age curve of fibrin reaction is indicated by a dotted-line curve.

The age curve of the fibrin reaction of the conjunctiva against the virus of epidemic keratoconjunctivitis and that of the skin against cantharidin possess common characteristics. The characteristics may be, therefore, extended to the age curve of the fibrin reaction in general.

Change in Fibrin Reaction with Change in Nutrition

In Japan, epidemic keratoconjunctivitis seldom occurs in the membranous form in adults and, in adults, associated systemic symptoms are also rare; whereas, according to Thygeson[8] they are more frequent in the United States. There are two possible explanations for this: the difference of race and the difference of nutrition (provided that the strain of the virus is the same).

There is a distinct difference in fat and protein content between Japanese and American food. Also, in Japan, an artificial infant food contains less fat and protein than mother's milk.

To see if nutrition might be a factor, the fibrin-reaction test with cantharidin was

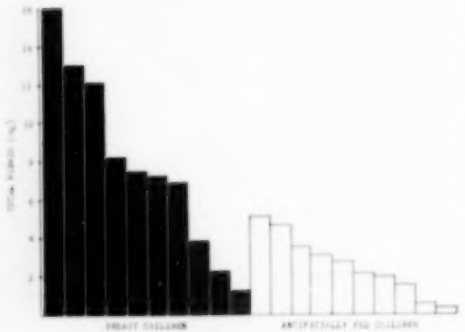

Fig. 3 (Mitsui, Tanaka, and Yamashita). Difference in fibrin reaction between breast-fed children and artificially fed children. Each symbol represents one person.

carried out on two groups: (1) 10 breast-fed children less than two years of age and (2) 10 artificially fed children of the same age group.

The fibrin content in the exudate was: Group I, 7.7 mg.; Group II, 2.6 mg., (average) (fig. 3). The fibrin reactivity of breast children is more than double that of artificially fed. One who takes a food rich in fat and protein seems to have a stronger fibrin reaction. The identical condition may also accelerate the systemic reaction, as systemic reactions and fibrin reactions have a common tendency.

Diphtheria toxoid in membrane conjunctivitis

Diphtheria toxoid has been beneficially used in Japan in the treatment of infantile epidemic keratoconjunctivitis with membrane formation. As to the mode of action, however, nothing has been known.

To answer this question, 15 children younger than 13 years of age were selected at random. They were injected with toxoid. The fibrin reaction was examined with cantharidin before and after the injection. The toxoid was injected, in most cases, every other day for three times 0.5, 0.7, and 1.0 ml., respectively. The second cantharidin test was performed from zero to 21 days after the last injection. The first test was made on the right arm, and the second test was done on the corresponding site of the left arm.

The total fibrin and the fibrin concentration before the injection of toxoid were 7.0 mg. and 7.6 mg./ml. (average), respectively; whereas, after the injection they were reduced to 3.2 mg. (55-percent less) and 3.8 mg./ml. (50-percent less), respectively.

No essential difference was demonstrated in the volume of the exudate and the concentrations of other proteins.

Five control cases were examined by two cantharidin tests without toxoid injection, performed at intervals of one to 19 days. There was not more than five and nine percent difference in total fibrin and fibrin concentration, respectively, between the two tests.

No doubt, the toxoid impedes the fibrin reaction and it can, therefore, be used in the treatment of membranous conjunctivitis with benefit regardless of the causative agent. The effect of toxoid seems to appear immediately after an injection. In one case, the second test performed at the same time as the first toxoid injection showed a considerable fibrin reduction. Further, the effect seems to persist over three weeks at least.

The immediate response of fibrin reaction to toxoid seems to indicate that the mechanism has nothing to do with an immunization process, which is completed in several weeks.

Histologic study[9]

It is well known that the virus of epidemic keratoconjunctivitis, as well as that of trachoma, has a special affinity for cylindric epithelium. In adults, the inflammation and follicle formation in particular are pronounced in the fornix conjunctiva, the semilunal fold, and the tarsal conjunctiva, where the epithelium is cylindric. But the inflammation is rather like catarrh and there is little follicle formation in bulbar conjunctiva where the epithelium is more stratified. It is, therefore, reasonable to suppose that the

follicle reaction may have some relationship with cylindric epithelium. Since the follicle reaction is absent in the newborn even in the fornix conjunctiva and there is a rapid development of the reaction in childhood, it would seem reasonable to assume that there may be a change with age in the structure of the conjunctival epithelium, in fornix conjunctiva in particular, similar to the change of the follicle reaction with age.

To study the problem, fornix conjunctivas were examined histologically. The material was taken from four fetuses (five to eight months) and 27 persons aged four days to 70 years. In persons, clinical and bacteriologic examinations were made prior to biopsy to exclude pathologic cases.

From the material, section slides were prepared as usual and a "cylindric index" and a "stratified index" of the conjunctival epithelium were measured as follows:

The width and the height of an epithelial surface cell were measured by a micrometer under a microscope. The ratio of the height to the width was defined as the cylindric index of the cell. The mean value of the index of 100 cells, selected at random in 10 slides from one conjunctiva, served as the cylindric index of the conjunctiva.

The number of cell layers in epithelium was similarly measured. The mean value of 100 at random measurement served as the stratified index of the conjunctiva (table 1).

As will be seen in Table 1 and from Figures 4 and 5, these two factors show a typical convex age curve similar to that of the follicle reaction. Consequently, it may be assumed that the follicle reactivity of a certain area of conjunctiva may be predicted by histologic examination, using the cylindric and stratified index.

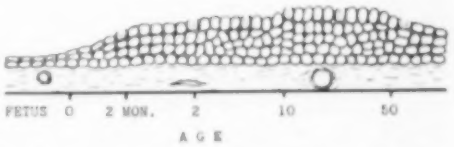

Fig. 4 (Mitsui, Tanaka, and Yamashita). Schematic presentation of data in Table 1.

Further, the finding seems to explain the clinical experience of Tanaka,[6] who reported that, in adults, Hemophilus conjunctivae affected the bulbar conjunctivas, while the fornix and tarsal conjunctivas were mostly spared. In young children, however, the same organism affected both fornix and tarsal conjunctiva and the infection was likely to be chronic, in contrast to the acute and short course of the infection in adults.

The organism seems to affect stratified epithelium readily. The fornix conjunctiva in young children is of stratified epithelium and is, therefore, readily affected by this organism; but in adults, it is cylindric and, consequently, it is spared.

Summary and Conclusions

The constitution varies greatly with age. It seems that there are two types of "age curves of the constitution" in conjunctival reactions—the convex and the concave. The fibrin reaction and the systemic reaction

TABLE 1

Change with age in cylindric index and stratified index of fornix conjunctival epithelium

Age	No. Cases	Average Cylindric Index		Average Stratified Index	
		Upper Fornix	Lower Fornix	Upper Fornix	Lower Fornix
Fetus, 5–8 mo.	4	0.35	0.43	2.08	2.65
4 days to 1.5 mo.	4	0.43	0.58	3.20	3.03
4.5 mo. to 1.5 yr.	4	1.03	1.08	4.05	4.63
3.7 to 9.3 yr.	3	1.07	1.10	4.23	6.10
11 to 44 yr.	12	1.11	1.18	5.38	5.70
53 to 70 yr.	4	0.75	0.60	4.50	4.35

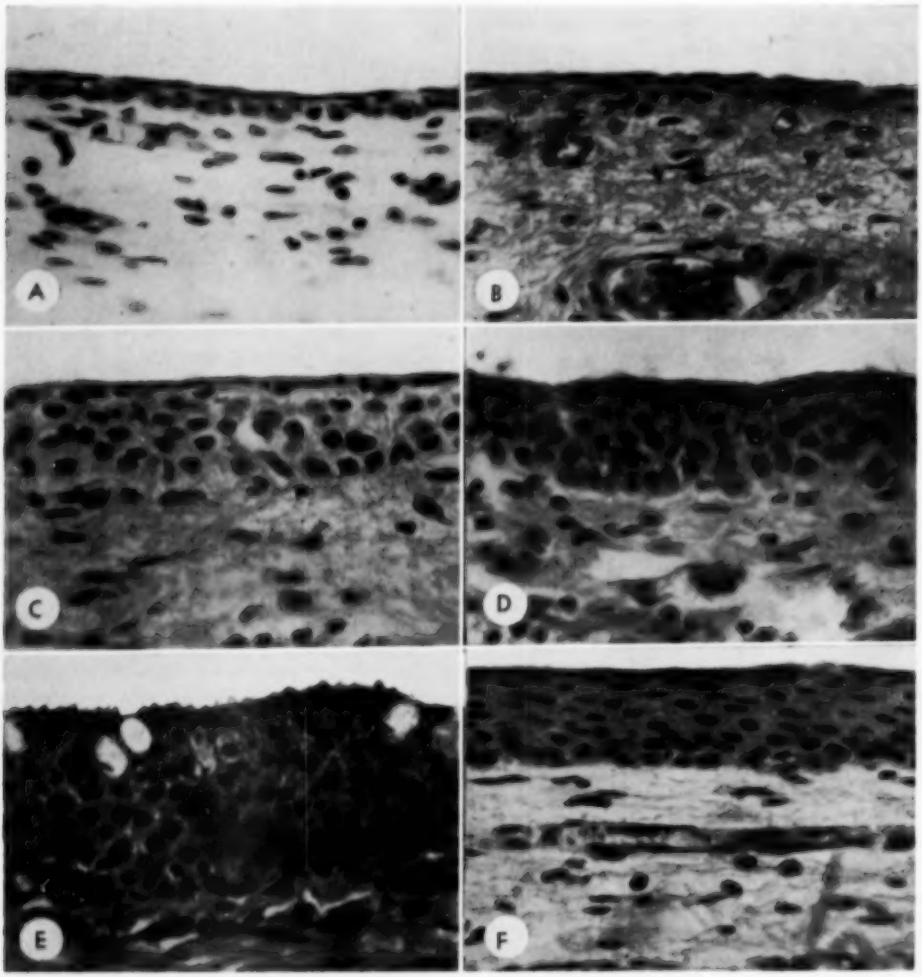

Fig. 5 (Mitsui, Tanaka and Yamashita). Histologic findings of conjunctival epithelium of upper fornix. (A) Six months' fetus (male). (B) Four days of age (female). (C) Thirty-nine day-old female. (D) One-year and six-month-old male. (E) Fifteen-year-old male. (F) Fifty-four-year-old male.

against the virus of epidemic keratoconjunctivitis show concave age curves through life. On the contrary, the follicle reaction, the preauricular gland reaction, and the keratic reaction show convex age curves. These curves are similar in form, but the age at which the reaction appears and that at which the highest degree is reached are in the youngest age group in follicle reaction and in the oldest age group in keratic reaction.

Nutrition seems to have some effect on these changes.

Diphtheria toxoid seems to impede the fibrin reaction.

The changes in conjunctival epithelium with age may influence the change in reactivities of conjunctiva and, therefore, the difference in the clinical findings in conjunctivitis in different age groups.

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QUANTITATIVE EFFECTS OF MIOPIESIN AND HYPERPIESIN ON INTRAOCULAR PRESSURE*

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In previous investigations, two pituitary hormones were found to act upon intraocular pressure.[1] They were labeled miopiesin and hyperpiesin. The former reduced and the latter increased tension. Some of the chemical characteristics of the two substances were described.[2] Normally, the two hormones are in equilibrium. Exaggerated physiologic states were observed to influence their formation.[3] The mechanism by which these hormones affect intraocular pressure was evolved in a number of investigations. Hyperpiesin was found to act upon parasympathetic centers, produce vascular dilatation of ocular vessels and a consequent increase in tension. Miopiesin influenced the sympathetic centers with a resultant vascular contraction and a decrease in tension.[4]

The present investigation is concerned essentially with the quantitative changes in animals following the introduction of increasing quantities of the two hormones. The quantitative experiments were postponed repeatedly because of the small quantities of the hormones available for investigation.

The rabbit was the experimental animal. Miopiesin and hyperpiesin were obtained from the spinal fluid of man and rabbits and injected intravenously into rabbits. Hyperpiesin was obtained in the form of spinal fluid removed from rabbits exposed to daylight and artificial light.[1] Miopiesin was obtained by two methods. In one instance, spinal fluid was removed from patients who were exposed to strong light and from rabbits which were subjected to a prolonged period of darkness.[1] In the other procedure, which gave miopiesin of a stronger activity, human or animal spinal fluid was incubated with rabbit posterior pituitary tissue. This method will be described in detail in a subsequent article. Ocular tension was obtained by the Schiøtz tonometer, using the 7.5-gm. weight. The recorded readings were in terms of the third corrected curve of Schiøtz. The eyes were anesthetized with two or three drops of one-percent butyn.

The animals were handled repeatedly for many weeks by the same investigator. The

* From the Toledo Hospital Institute of Medical Research. This study was supported by a grant from the Walter Snyder Ophthalmic Foundation.

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rabbits were exposed many times to tonometry prior to these experiments. Any apprehension or fear was removed by repetitive steps which produced no injury and a minimum of discomfort to the animals. Prior to the experiment, the animals appeared placid and without signs of apprehension (fig. 1).

The intraocular pressure was determined on the experimental animals prior to the injections of the hormones. The tension was taken at 10-minute intervals for a period of 130 minutes. The standard deviation was found to be within the limits of ±1 mm. Hg.

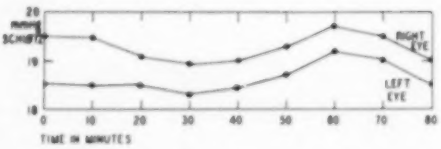

Fig. 2 (Schmerl and Steinberg). Tonometric measurements were performed on normal rabbits to be used in the experiment. The animals were handled repeatedly and had tonometric measurements in the past. The tension was taken at 10-minute intervals for 80 minutes or longer. The calculated standard deviations from the average values of these experiments were less than ± 1.0 mm. Hg.

Results with hyperpiesin

The variation in content of hyperpiesin in a given sample of spinal fluid and the variable responses on the part of animals precluded an accurate quantitative measurement of the hormone. However, for the purposes of this experiment, a cc. of spinal fluid will be referred to as one unit. Tension measurements were taken at 10-minute intervals for periods of 80 to 130 minutes.

Four rabbits, with an individual normal intraocular pressure of 21 to 33 mm. Hg, were injected intravenously with spinal fluid in varying doses. One animal received three units of hyperpiesin. Within 30 minutes after the injection, the tension became increased by 6.5 mm. and in 40 minutes by 10 mm. The animal appeared slightly apprehensive. No abnormal ocular changes were noted. Another rabbit with a normal tension of 27.5 mm. Hg also was given three units. After 20 minutes, the tension became increased. The greatest increase was 7.0 mm. Hg with a total tension of 34.5 mm. Hg. No abnormal changes were observed in the eyes.

A third rabbit was injected with four units of hyperpiesin. The initial tension was 33 mm. Hg. Within 30 minutes there was a rise of 8.0 mm. Hg. In 80 minutes after injection the tension was increased by 12 mm. Hg and in two hours by 17.5 mm. Hg, reaching a tension of 49.5 mm. Hg. The eyes showed abnormal changes. The corneoscleral limbuses became swollen and the irises were hyperemic.

A fourth rabbit was given five units of

Fig. 1 (Schmerl and Steinberg). Appearance of rabbits prior to the experiment. The photograph shows the method of bundling the animals, their apparent placidity and lack of apprehension. These factors were considered necessary to obviate any possible variations in intraocular pressure from causes other than those to be tested.

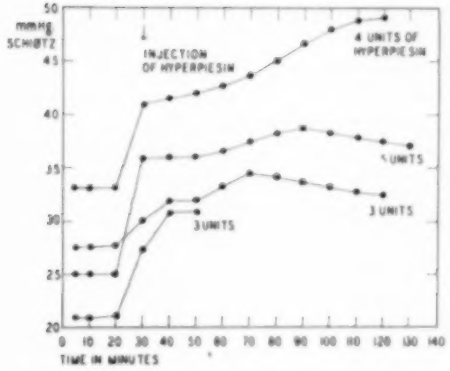

Fig. 3 (Schmerl and Steinberg). Tonometric measurements were performed on four rabbits after they were injected with variable quantities of hyperpiesin. Considering that each cc. of spinal fluid contained a variable quantity of hyperpiesin, the responses of the animals to increasing doses showed generally a rise in tension corresponding to the number of units injected. Rabbits with four and five units showed abnormal changes consistent with an attack of acute glaucoma.

hyperpiesin. The normal tension was 25 mm. Hg. In 30 minutes there was a rise of 11 mm. Hg, with an appearance of abnormal changes consisting of hyperemia of irises, cloudiness of the anterior chamber, and slight contraction of the pupils. The maximum increase was 14 mm. Hg, 80 minutes after injection. The tension was maintained during the period of 130 minutes during which the tonometric measurements were taken (fig. 3). In 24 hours after the injections, the tensions returned to normal and the abnormal ocular changes were no longer present.

Results with miopiesin

Three rabbits were injected with human or rabbit spinal fluid which contained miopiesin, a pituitary principle which reduces intraocular pressure. For purposes of this experiment, each cc. of spinal fluid was considered as a single unit. Each of three animals was injected intravenously with a single unit of miopiesin. The normal tension for each of the rabbits was 30 mm. Hg. Within 30 minutes after injection, the tension was reduced by 2.0 to 6.0 mm. Hg. The decrease persisted for a period of one hour, which represented the duration of this experiment. No abnormal ocular changes were observed.

Each of three rabbits was injected with three units of miopiesin. The normal tension of one animal was 30 and 28 mm. Hg in the right and left eyes, respectively. Within 30 minutes, the tension was reduced to 18 and 16 mm. Hg, respectively. The second animal had normal tensions of 30.5 and 28 mm. Hg, which were reduced to 20.5 and 19 mm. Hg. The third animal with normal tensions of 30 and 30 mm. Hg showed a decrease to 16 mm. Hg (fig. 4). No abnormal ocular changes were noted.

Discussion

In a previous article[5] we raised the question whether the neurovascular mechanism may be involved in ocular hypertensive episodes. If the question can be answered in the affirmative, two others come to mind. May

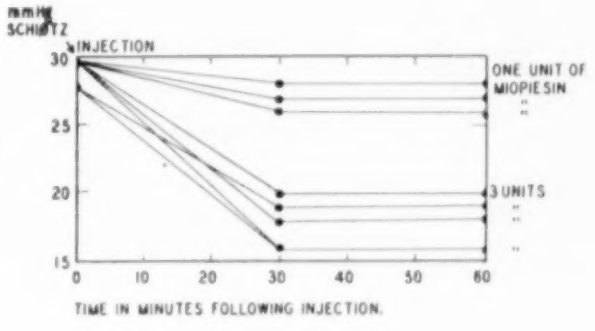

Fig. 4 (Schmerl and Steinberg). Tonometric measurements were performed on several rabbits. Each of three rabbits was given one unit of miopiesin with a reduction of tension by 2.0 to 6.0 mm. Hg. Each of three rabbits was given three units of miopiesin with a decrease of tension of 9.0 to 14 mm. Hg. Despite the variability of quantity of miopiesin in each sample of spinal fluid, the rabbits responded with a more or less quantitative decrease of intraocular pressure to increasing doses of miopiesin.

an ocular hypertensive episode be associated with manifestations of acute glaucoma? Will other mechanisms which control intraocular pressure neutralize the effects of the neurovascular influence?

These experiments indicate that hyperpiesin, the pituitary hormone which acts through the parasympathetic centers and the ocular vessels, may produce a considerable degree of intraocular hypertension in an otherwise normal animal. The condition necessary for the development of hypertension was a sufficient concentration of the hormone. This investigation indicates further that a hypertensive episode may be associated with manifestations of acute glaucoma. Whether any other mechanism which controls intraocular pressure could neutralize the effect of hyperpiesin could not be determined in these experiments. However, in previous studies[7] a number of factors were described which inhibit the action of the pituitary principles. Insufficient material prevented further exposure of animals and further observations.

It is generally accepted[6] that hypertension may not necessarily produce pathologic changes and that eyes vary in their ability to withstand intraocular pressures without damage. Some eyes may succumb to what may be considered to be the upper limits of the normal range of intraocular pressure, while other eyes may not show any abnormalities in the presence of a considerable hypertension. It is, therefore, of some significance that every one of the experimental animals that developed an increase in tension of 10 mm. Hg or more showed manifestations of acute glaucoma.

Another and very pertinent problem is the treatment of glaucoma. In these experiments there is suggestive evidence that miopiesin is capable of reducing intraocular pressure. The degree of reduction has been demonstrated to vary with the concentration of the hormone. Any clinical evaluation of the role that miopiesin may play in the treatment of glaucoma and in the type of the disease must await methods of purification, isolation, and production of sufficient quantities.

Summary

A quantitative relationship was found to exist between the changes in intraocular pressure and the concentration of hyperpiesin and miopiesin, the two pituitary hormones which influence intraocular pressure. Increasing quantities of hyperpiesin resulted in corresponding elevations of tension. Increasing the quantity of miopiesin produced a corresponding decrease in tension.

When the injection of hyperpiesin raised intraocular pressure to 10 mm. Hg or more, ocular changes made their appearance. These changes were consistent with those found in an attack of acute glaucoma.

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A STUDY OF SUBLUXATED LENSES DURING ACCOMMODATION

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In 1941, Luedde* reported on two cases of subluxated lenses during accommodation. He found that, during accommodation, iridodonesis was abolished in patients with subluxated lenses. At distance, iridodonesis was marked. In the extreme of accommodation, iridodonesis returned. However, in accommodation, iridodonesis ceased. Luedde reasoned that the cessation of iridodonesis was due to the vitreous body pushing forward on the lens and the lens on the iris, thus resulting in cessation of iridodonesis. He believed that this definitely proved the Tscherning theory of accommodation—that accommodation was caused by vitreous pressure on the lens.

CASE REPORTS

Seven cases of subluxated lenses and one case of iridodonesis with no subluxation were studied in the U. S. Army Hospital, Fort Leonard Wood, Missouri. The same technique employed by Dr. Luedde, that of observing iridodonesis during accommodation, was utilized. In three cases movies were taken. In addition to Dr. Luedde's technique, observations were made using the Universal slitlamp. These studies also included observation of the periphery of the lenses during the act of accommodation.

The cases studied can be divided into three groups:

1. Those cases in which trauma to the eye was a cause of the dislocation.
2. Those cases of hereditary dislocation of the lens.
3. Iridodonesis in an apparently normal eye.

As might be expected, there is a marked difference in appearance and behavior in these three types of cases. Signs of inflammation are present in the traumatized eye, and not in the hereditary dislocations.

Group I. Dislocation due to trauma

CASE 1

This 21-year-old man gave a history of having been hit in the right eye with a large weed at the age of 11 years. Immediately following the injury, he was treated with drops and the right eye was patched.

Visual acuity was: O.D., counts fingers at six inches; O.S., 20/20 with 0.5D. sph.

External Examination. The right eye showed dislocation of the lens downward and nasally. There were no synechias.

Ophthalmoscopic examination. The right eye showed immature traumatic cataract changes in the dislocated lens. A large healed central chorioretinal lesion was also observed.

Accommodation. The patient was observed for iridodonesis in the manner of Luedde. The object of fixation was brought in from a distance of one meter. The object was moved both horizontally and vertically.

In this case, iridodonesis was marked in both directions and did not change during accommodation. Accommodation could not be measured in the right eye because of the retinal lesion but it was normal in the left eye. When a motion picture was made and movements of the fixation object were slower, no iridodonesis could be seen.

CASE 2

This 21-year-old man gave a history of having placed some carbon-dioxide ice into a jar and screwing the top of jar on tightly. The jar exploded sending out fragments of glass which cut the right cornea and the left eyelids. Three days later an iridectomy was performed on the right eye.

* Luedde, W. H.: What subluxated lenses reveal about the mechanism of accommodation. Am. J. Ophth., **24**:40 (Jan.) 1941.

Visual acuity was: O.D., good light projection; O.S., 20/40, with a −0.5D. sph. ⊂ −0.5D. cyl. ax. 90° = 20/20.

External examination. The corneal scar was located at the 7-o'clock position, with an adherent leukoma containing the right pillar of a surgical coloboma. The lens was subluxated upward and nasally and was cataractous. A small inferior peripheral zone of the lens, to which the zonule was attached, remained clear. The pupil reacted well. A thick posterior synechia was present.

Accommodation was normal in the left eye but could not be measured in the right eye. There was no iridodonesis present in this eye at any time, during horizontal or vertical movements, at near or at far, possibly due to the posterior synechia.

CASE 3

This 21-year-old man gave a history of being hit in the right eye with a stone at the age of four years. He recalled only that he was treated with drops and ointment.

Visual acuity was: O.D., faulty light projection; O.S., 20/15.

External examination. There was a 15-degree right exotropia. The consensual reflex of the right eye was much more marked than the direct light reflex. There were many posterior synechias. A traumatic cataract was present in the dislocated lens. The left eye was normal.

Ophthalmoscopic examination. In the right eye there was a marked healed diffuse chorioretinitis and optic atrophy. The left eye was normal. The right eye could not be refracted; the left eye was emmetropic.

Accommodation of the left eye was normal. No iridodonesis in the right eye was seen at any phase of accommodation or relaxation of the left eye. At another examination, under subdued illumination, a very slight wobbling of the iris was noted on horizontal movement. In bright light, this movement disappeared. This demonstrated the effect of the light reflex on iridodonesis.

CASE 4

This 24-year-old man gave a history of having been hit in the left eye with a baseball at the age of 11 years. His lids were lacerated and he suffered direct injury to the eye. The lids healed well and the eye was treated with drops.

Visual acuity was: O.D., 20/20; O.S., no light perception.

External examination. The right eye was normal. The left eye showed a dislocation of the lens upward and nasally with a vitreous prolapse forward to the edge of lens. Small, thin posterior synechias were present. During accommodation of the right eye, observations were made on the left eye. The vitreous, clearly observed because of its filamentary composition, was seen to rise during the act of accommodation and recede during relaxation. No changes were noted at the periphery of lens during accommodation.

Ophthalmoscopic examination. The right eye was normal. The left eye, in addition to the subluxation of the lens, had a healed chorioretinal lesion completely surrounding the disc. The disc was atrophic and partially covered with glial tissue.

Accommodation. Iridodonesis occurred during accommodation if the amplitude and speed of movement of the fixation object were adequate. If the movement of the object was slow and amplitude decreased, no iridodonesis occurred. The movement of the vitreous over the ciliary body indicated that contraction of the ciliary body could push the vitreous during accommodation.

Group II. Hereditary dislocation of lens

CASE 1

This 20-year-old man gave a history of poor vision since birth. The visual acuity could never be improved. The ectopia lentis was associated with arachnodactyly.

Visual acuity was: O.D., 20/200, with a +1.25D. sph. ⊂ +2.0D. cyl. ax. 135° = 20/40; O.S., 20/300, with a plano sphere ⊂ +1.25D. cyl. ax. 145° = 20/300.

External examination. In the right eye, the lens was subluxated upward and outward. The zonular fibers in the right eye were extremely loose and could be seen to oscillate. The area between the fibers was optically empty. The vitreous was seen posterior to the zonule. No synechias were present.

In the left eye, the lens was subluxated upward and outward. The zonular fibers were tense. The lower edge of the lens was slightly irregular in appearance. The zone between the zonular fibers was optically empty and vitreous could be seen behind the zonule.

Ophthalmoscopic examination. The right eye was normal, as was the left eye.

Accommodation in left eye was found to vary between three and four diopters. The pupil of the left eye was dilated with euphthalmine and the periphery of the lens was observed during accommodation. The patient was instructed to look at far and then near; the near object and far object being in a straight line with the visual axis so that no movement of the eye itself was required.

During accommodation, the anteroposterior diameter of the periphery of lens increased. The zone between the zonular fibers remained clear and the vitreous did not appear to move forward. No change could be observed in the zonule and no definite change in the height of lens was observed.

The activity of the pupil prevented accurate estimation of whether the lens was elevated or depressed during accommodation. It appeared relatively constant.

Following these observations, the accommodation of the eye was again checked and found to be three diopters in the left eye. In the right eye no accommodation could be measured at all. The zonular fibers were lax and did not exert any pressure upon the capsule of the lens.

Iridodonesis was marked in this patient at near and at far, when the amplitude of movement of the fixation object was adequate. If amplitude and speed of motion were decreased, iridodonesis was either not seen or was not nearly so marked. This observation was again demonstrated in movies. On one exposure, iridodonesis was not seen; on another, it was well demonstrated. This case also demonstrates that zonular tension is necessary for accommodation.

CASE 2

This 21-year-old man believed that he was born with poor vision. He was first aware of his difficulty at the age of 10 years when he was treated at Northwestern University. He was also seen at Illinois Eye and Ear Infirmary in January, 1949, at which time a diagnosis of Marfan's syndrome was made.

On February 10, 1949, there was an intracapsular extraction of the lens of the right eye, with complete iridectomy. The postoperative course was uneventful and refracted vision was 20/100 in the right eye. On August 21, 1951, the patient was readmitted to the hospital with a diagnosis of secondary glaucoma and retinal detachment in the right eye. He was treated with atropine and Pyromen and his eye cleared very nicely and was asymptomatic.

Visual acuity. O.D., doubtful light projections; O.S., 20/200, with a +9.0D. sph.= 20/40.

External examination. In the right eye, there was a 15-degree exotropia. Keratic precipitates were present. There was a broad iridectomy from the 11- to the 1-o'clock positions. There were posterior synechias between the iris and the vitreous.

The left eye showed subluxation of the lens upward. There were no posterior synechias. In a large area, extending from the 5- to the 7-o'clock position, the zonule was not attached to the lens. The zonular fibers were seen to extend from the 5- to the 4-o'clock and from the 7- to the 8-o'clock positions. The remainder of the zonular area was covered by iris.

Ophthalmoscopic examination. In the right eye, the fudus reflex could be seen easily but

no fundus details could be made out. Observation of accommodation was unsuccessful.

Iridodonesis was present in this eye during the act of accommodation and, as in the previous case, amplitude and speed of motion determined how much iridodonesis could be seen. Motion pictures of this patient were unsatisfactory because iridodonesis was not adequately shown.

CASE 3

This patient stated that as long as he can remember he had had difficulty seeing. He has been examined by many physicians all of whom had said that his condition could not be improved. One brother had the same difficulty.

Visual acuity was: O.D., 20/200, with a −4.5D. sph. = 20/100; O.S., 20/200, with a −7.0D. sph. ⊂ +2.0D. cyl. ax. 85° = 20/40+.

The amplitude of accommodation in the right eye was three diopters; in the left eye, 3.75 diopters.

External examination. The right eye showed dislocation of lens upward and nasally. The zonular fibers were present at the 7- and 8-o'clock positions. There were two strands containing many zonular fibers extending from the periphery to the lens. No synechias were present. The vitreous was seen posterior to the lens and zonule.

The left eye showed subluxation of the lens upward and temporally. Zonular fibers were seen along the entire extent of visible lens periphery. The area between the zonular fibers was optically empty and vitreous was seen posterior to this area. The zonular fibers contained small amounts of pigment but no posterior synechias were present.

Ophthalmoscopic examination. In the right eye the fundus was normal. The left eye was normal.

Iridodonesis occurred during accommodation and was more noticeable after several attempts to induce it. Both eyes showed the same amount of iris movement. Horizontal and vertical movements of the fixation object showed iridodonesis during accommodation. It was also observed in bright illumination and subdued illumination. The visible vitreous did not come forward during accommodation. No observable changes were present in the zonule. The anteroposterior diameter of the periphery increased during accommodation. Due to the action of the iris at near, it was not possible to tell whether the lens was elevated or depressed during accommodation.

Group III. Iridodonesis in apparently normal eye

CASE 1

This patient had suffered a blow to the right eye several years before the time of examination. He had experienced no difficulty with the right eye.

Visual acuity was: O.D., 20/20; O.S., 20/20.

External examination. Iridodonesis, present in the right eye, but not in the left, followed the pattern described by Luedde. At a distance the iris appeared to wobble: as accommodation occurred the wobbling decreased but as maximum accommodation was reached, the wobbling of the iris became apparent. This occurred in five out of 10 observations and was more frequent in the vertical than in the horizontal meridian. Slitlamp studies were not done in this case.

Ophthalmoscopic examination was negative.

No subluxation of the lens was seen in this case but, as sometimes occurs in normal individuals, iridodonesis was present. It is possible, however, that some break in the zonular fibers was not observed in the limited examination.

DISCUSSION

My findings show a variety of types of subluxated lenses. As would be expected, the occurrence of iridodonesis varies with the pathologic alterations, as well as with such other factors as: (1) The speed of motion of

the fixation object; (2) the presence of posterior and anterior synechias; (3) the status of the pupil (near reflex and light reflex; since these factors have a tonic effect on the iris, they play an important part in stabilizing the iris); (4) the condition of the zonule and the ability of the eye to accommodate in an apparently normal fashion.

The observations in cases of hereditary subluxation of the lens would indicate that the von Helmholtz's theory of accommodation is correct. Accommodation occurred only when the periphery of the lens was in the pupillary zone. It would therefore seem that the lens periphery must have been thick in order to produce accommodation. According to the Tscherning theory, the periphery of the lens would be thin, due to vitreous pressure, and there would be "negative" accommodation in the periphery.

There was no protusion forward of the vitreous into the zonular area, and the area between the zonular fibers was optically empty. The visualized vitreous apparently exerted no effect on the periphery of the lens in the one case in which the vitreous was between the ciliary body and the lens. The anteroposterior diameter of the periphery of the lens apparently increased during accommodation in these cases.

It is my opinion that no definite conclusions can be made from observing accommodation in pathologic eyes. Luedde's observations were duplicated but other observations would lead one to believe that the Helmholtz theory was correct. In the case of the apparently normal eye with iridodonesis, 50 percent of the time the typical findings of Luedde were evident. The fact that iridodonesis was not always present may be significant.

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I wish to thank Dr. W. H. Luedde for his advice in this study.

SURGICAL CORRECTION OF CICATRICIAL ENTROPION AND TRICHIASIS*

A report of 244 cases

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Our experience with entropion and trichiasis is largely limited to the cicatricial type secondary to healed or nearly healed trachoma. The pathology in these cases is well known. Scarring of the conjunctiva and tarsus follows the healing of trachoma and the retraction of these fibrous bands causes the entropion and trichiasis. This should be seriously taken into consideration for the choice of the operation, namely a smaller contracted lid. Several different procedures have been described but none has received the universal acceptance and satisfaction of all surgeons.

In this hospital, the procedure herein described has been used for the past three decades or more. It is essentially a modification of Van Milligan's (Millingen's) technique, modified and perfected by Dr. Charles Webster, former professor of ophthalmology at the American University of Beirut, and recently deceased.

Description of the operation

Anesthesia

In the hands of the inexperienced operator general anesthesia is preferable, as it does not cause any distortion of the lids. If, for some reason, it is contraindicated, local anesthesia may be used—one-percent novocaine infiltration of the lid including a subconjunctival injection.

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Procedure

The lid is everted and Desmarre's lid clamp is applied. This fixes the lid and acts as a hemostatic. With a sharp knife an incision parallel to the lid border is made from outer to inner canthus in the subtarsal sulcus passing inside the lacrimal punctum. The incision includes the conjunctiva and the hypertrophied and deformed tarsal plate to the subcutaneous tissue. Care should be taken not to include any hair follicles in the proximal lip of the incision as these may grow behind the graft and be a cause of future trouble.

After completion of the lid incision, a mucous membrane graft is taken from mucous membrane of mouth. The lower lip is everted and the submucosa is infiltrated with one-percent novocaine and adrenalin (1/1,000) solution. The graft is outlined with a knife and the dissection is continued with scissors to obtain a graft which is two to three mm. wide, and as long as the incision in the lid demands. The graft is then cleaned of all the fat from its under surface making it as thin as possible. It should fit the lid incision perfectly without being stretched or gathered up into folds, and the ends should taper off to a point. The donor site is closed with chromic catgut 3-0 mattress sutures.

With the lid partially everted the incision is then cleansed of blood clots and the graft placed in the incision, a little pressure with a moist cotton is enough to manipulate it in place. No sutures of any kind are needed. The lid is replaced and vaseline is spread on eye pads and the eyes are bandaged for 24 hours after which cold boric or saline compresses are used for four to five days.

If the trichiasis involves a segment of the lid, a partial graft may be used. However, we prefer a total one to correct the entropion completely and thus avoid further procedures.

Our preference for this operation is because of its simplicity and, more important, because it corrects the basic pathology in cicatricial entropion and trichiasis. It adds tissue to the scarred and shortened lid and will never cause lagophthalmos as do other frequently used operations (Snellen's, tarsectomy, and others).

It is good to draw attention to this fact, which will explain the cause of failures in this condition. If the trachomatous process has not completely run its course, the shrinking of the conjunctiva and of the tarsus continues to progress after the operation and once more throws the cilia into faulty position.

Report of cases

This operation was performed on 244 patients between the years 1940 and 1954. It was done for over two decades previously but due to complete destruction of our records by fire we are unable to report previous cases.

All these cases except two were secondary to trachoma. One was posttraumatic and the other followed irradiation of the conjunctiva for vernal catarrh.

Age

Wide range in age, the youngest being five years and oldest 80 years. Distribution in age groups shows:

Years	Cases
5-10	4
11-20	39
21-30	55
31-40	62
41-50	55
51-60	19
61-70	7
71-80	3

Anesthesia

1. *General.* Seventy patients had intravenous pentothal, nitrous oxide, and oxygen with a leach airway.

2. *Local.* One hundred seventy-four patients had novocaine (one percent) local infiltration.

Extent of graft

Complete: Bilateral, 150; unilateral, 74.

Partial: Bilateral, 6; unilateral, 9.

On the lower lids five transplantations were performed: Complete bilateral, 2; complete unilateral, 2; partial bilateral, 1.

Previous operations

Sixty-four patients had previous operations (52 of these outside our hospital) one, two, or more times. These are subdivided as follows: Tarsectomy, 7; transplantation, 22: (10 of these in our hospital); Snellen's, 11 (two of these in our hospital); various operations, nature unknown, 24 cases.

Two that had Snellen's operation had lagophthalmos.

Results

On these 244 patients, 409 grafts were used, the outcome of these was:

1. Complete graft take and correction of trichiasis and entropion 370 or 90.46 percent.
2. Partial graft take and correction of trichiasis and entropion 13 or 3.18 percent.
3. Complete take of graft but residual trichiasis 23 or 5. 63 percent.
4. Failure of graft to take three or 0.73 percent.

It may be seen that the grafts took, partially or completely, in 406 cases or 99.27 percent and there was successful correction of trichiasis and entropion with the first attempt in 383 cases (370 + 13) or 93.6 percent.

In the 23 cases where trichiasis persisted, in the majority one or two hairs were turned inward or grew behind the graft and electrolytic epilation was enough to relieve the condition. In few a partial transplantation had to be done.

In the three failures, a complete transplantation operation was repeated with success.

Complications

No complications were met except these following: in three cases bleeding occurred under the graft one, two, and six days postoperatively. In spite of this the graft took and trichiasis was relieved. Also in one case there was a postoperative infection of the lid starting at the outer canthus and probably due to the injection. This was controlled, the graft took, and the trichiasis was relieved.

Summary

A procedure for correction of cicatricial entropion and trichiasis developed by Dr. Charles Webster is described. A total of 244 patients' records were reviewed. The procedure is simple and was successful in correcting 93.6 percent of cases at first procedure. The grafts took in 99.27 percent of the cases.

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PRISMATIC EFFECT ON SYMPTOMS OF MENIÈRE'S DISEASE

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This study was undertaken after reading the report of Utermohlen,[a] which was translated for the U. S. Department of Naval Research in London in November, 1951. That article is summarized here.

Dr. Utermohlen's detailed report was the result of 11 years of study and the treatment of 1,060 cases; 95 percent of the patients reported relief from Menière's syndrome.

The syndrome itself occurs in varying degrees and is characterized clinically by vertigo, nausea, vomiting, tinnitus, and usually a hearing loss.

It is Dr. Utermohlen's thesis that success can result only if the treatment is applied to patients who have clearly defined labyrinthine disease. The cause of the condition is unknown, although it is suspected that defects of the blood supply to one or more semicircular canals, especially of the horizontal canals, may be essential in the etiology of the disease.

In making my own study, the patients were selected most carefully. Only those who had had a complete physical examination, including a specific ear, nose, and throat check by an otolaryngologist, yet, although all physical examinations were negative, continued to have the symptoms, were accepted for trial.

In addition, I included one patient who had streptomycin poisoning while being treated for systemic tubercular disease. This apparently resulted in the development of the Menière's syndrome, accompanied by an almost complete loss of hearing in both ears.

Following are some of the tests which were suggested by Dr. Utermohlen:

1. In many cases, poor hearing can be demonstrated on one side. His tests are conducted very simply by the use of several tuning forks, and also by checking the patient's hearing by whispering from some distance while the patient covers first one ear and then the other. These patients frequently react to the sound of a C4 tuning fork (2,048 vibrations per second) by a pupillary and palpebral reflex. This reaction is usually equal on both sides.

2. A Bárány test of a simple sort is also used. The patient, while seated, is required to extend his arm forward pointing at some object, then to close his eyes and move his arm fully extended to one side and then bring it back to the original point. These patients usually show some defect in their ability to do this, and it is more pronounced with one arm than the other.

3. Dizziness is induced by a rotating disc causing optokinetic nystagmus. A device which allows a pattern of white and black stripes to be moved laterally in either direction against a black field is used. Such patients, fixing on these moving white stripes, rapidly become dizzy. The time required to become dizzy almost always varies.

These tests usually indicate that the patient with Menière's disease has some slight unequal disturbance of the semicircular canals, especially the lateral canals. Taken together, they indicate whether the right or left canal is affected. Further tests of the visual elements in this disease are also made:

1. The patient is fitted with + 20 D. sph. on both eyes, which prevent fixation but enable the examiner to see the movements of the

eye. The patient is then rotated a few times while standing, thus usually developing a lateral nystagmus. The length of time the nystagmus lasts is determined following rotation to the right and to the left.

2. Muscle imbalance is tested with a Maddox rod or Risley prisms at 20 feet and at 16 inches.

Rarely are hyperphorias found among this group, but moderate esophoria at distance or exophoria at distance and near is extremely common. There is, therefore, some muscle imbalance quite regularly found, especially on near convergence, which may be expressed as either esophoria or exophoria, but neither of which, nor their degree, seem to be of primary importance.

The treatment approach is simple. In addition to any usual correction for defects of the ear or vision, base-in prisms are fitted. Clip-ons work well in this situation. The base-in prisms vary in strength starting with one-half prism diopter and they can be increased up to and including as much as six prism diopters. Rarely are six diopters necessary, however; the strength of the prisms varies with the degree of the disturbance. It is essential that they be mounted base-in and always on a horizontal plane; this is so whether there be esophoria or exophoria.

A general report of the subjective symptoms should be required from the patient within two weeks after trial prisms are issued. This will prove useful for subsequent adjustments. It is of particular importance that the final spectacles received by the patient are exactly as prescribed. The interpupillary distance is of extreme importance. It must be precisely determined and taken into account when the spectacles are made.

The explanation of the results, which appear to be good in a large number of cases, is purely speculative. It is reasoned that much of the work of the extraocular muscles is involved in convergence, and one is reminded of the reflex association of the middle ear with the motor function of the extraocular muscles.

Contraction of eye muscles is sensed, as in all muscles, through certain proprioceptive nerve endings in them. Their impulses are carried to the brain and are thought to affect the threshold of the nerve endings in the semicircular canals. This, then, may be considered as a reciprocal reflex to that more ordinarily thought of between the ears and and the motor endings in the eye muscles. The site of the origin of the nerve impulses causing the symptoms of Menière's disease lies, therefore, in the extraocular muscles and in the retina.

Attacks of vertigo may be induced in an individual who is blind in one eye but in whom the ocular movements still exist, and are due to the muscle sensory fiber which carries the sensation of position of the eye and are reflexly connected with the vestibular nerve. This reflex which exists in all normal individuals is tolerable and unnoticed, except in patients with ear disease.

Much of the work of the extraocular muscles is concerned with convergence. It is believed that the overaction of the medial recti is the cause of the strain which induces the attacks in Menière's disease. By placing prisms base-in before the eyes, these muscles do not have to act as strongly as they do ordinarily, and in this way muscle strain is relieved. By using prisms of slightly different powers, we take into some account the difference between esophoria and exophoria; however, it is thought best not to try to correct this muscle imbalance directly.

The symptoms are relieved in a short time when prisms are worn and return when the prisms are removed. If the prisms are reversed (made base-out), inducing more convergence, the symptoms become more pronounced. With prisms of the correct power and position, patients can perform all of the tests listed above without difficulty. Furthermore, they are not as sensitive to noises as exemplified in the test with the tuning fork.

Of the 20-odd cases I have seen and worked with, those with true Menière's disease have all been successfully relieved of

their symptoms. The following are two of the outstanding cases:

Case reports

Case 1

Mr. D. O., an office worker was 60 years of age at the time seen (January, 1952). He reported that attacks of severe vertigo, headache, nausea, and vomiting had been occurring for the past 10 to 15 years. The occurrence of these attacks originally was from two to four times a year, each attack lasting from 12 to 24 hours. However, the time intervals became shorter, the duration longer, and the severity greater. At the time of treatment they were occurring once or twice a week. The last attack had occurred while he was driving during a snowy day and was caused by the attraction of the snow flakes as they came down and toward his car.

He had consulted numerous physicians and all examinations had been negative. Sedatives and Dramamine had been prescribed but afforded no relief. The only relief came from lying down in a darkened room with eyes closed and "holding on to the bed to keep from falling off."

He was wearing a hearing aid. The otolaryngologist to whom he was referred reported definitely that this was a case of Menière's disease.

Both the external and internal eye examinations manifested no pathologic condition. Refractively, there was moderate hyperopia with slight astigmatism and presbyopia. The phorias were one diopter of esophoria at distance and eight diopters of exophoria at near, with the correction. The adduction at near was 28 prism diopters and the near-point of convergence three inches.

One-half a diopter of base-in prism, O.U., was prescribed in the form of a clip-on and the patient was told to wear this at all times for two weeks. When next seen, Mr. D. O. reported one attack of severity but the vertigo that existed had definitely been relieved so that the movement of objects had "slowed down" during the attack. The clip-ons were changed to include one prism base-in, O.U. Two weeks later the patient reported that no attacks had occurred but that there had been several spells of "stomach giddiness." Now one and a half prisms base-in, O.U., were prescribed. This was worn for three weeks, and the patient reported that there had been no attacks and no vertigo during this period. Needless to say, the patient was quite happy, and his glasses were changed to incorporate the prism.

A recent examination of the patient, one and a half years after the treatment just described, disclosed that there had been no recurrences of the Menière's syndrome.

Case 2

Mr. E. M., seen in early November, 1953, aged 29 years, had a history of specific tubercular infection beginning at the age of 16 years, which ultimately included both kidneys, the bladder, ureters, urethra, and testicles. The lungs were never involved. The ultimate result of medication and surgical intervention which included in more recent years the use of streptomycin was the removal of one kidney, the bladder, ureters, urethra, one testicle, and part of the remaining one.

Following a course of streptomycin, which was given during a critical hospitalization period, the patient was left with a severe hearing loss (partially restored with a hearing aid), and partial inability to maintain balance while walking. The walking imbalance was intensified at night when vision was minimized.

The symptoms of nausea, headache, and vomiting developed shortly afterward, and there was no pattern of occurrence given. In the course of taking the patient's history, I inquired as to whether or not the attacks occurred shortly after concentrated close work. The patient thereupon confirmed that the more recent attacks had occurred after such close work.

The external and internal eye examinations revealed no pathologic condition, past or

present. A manifest examination disclosed one-half diopter of simple myopia correctible to 20/20 in both eyes. There were two diopters of esophoria at distance and four of exophoria at near. The convergence ductions at distance and near were high.

Since he did not wear glasses, he was given one-half diopter prism base-in on both eyes in a Zyl frame for constant wear.

Two weeks later, the patient reported no apparent variation except the lessening of dizziness while walking. He had not had any headaches. He called a week later to say that a mild headache had occurred. The prisms were increased to one diopter base-in, O.U.

The next six weeks passed without the occurrence of headaches with only one exception. On a particular day, the patient awakened late for work and in his haste to get to the office he forgot to take his glasses. He read for a period of about 30 minutes, whereupon his former symptoms began to recur. A mild headache developed and the nausea was becoming more severe. He hastened home and put on his glasses. In approximately 45 minutes to one hour the symptoms were completely relieved.

The final prisms were made up with the correction of the myopia included. There have been no recurrences of any symptoms since then.

Summary

Relief has been obtained in patients suffering from the symptoms of Menière's disease by fitting them with prisms placed base-in before the eyes. This is done with the intent to relieve the effort required for near convergence, which is thought to be one of the precipitating factors in a Menière's attack. Prisms base-in are given regardless of whether esophoria or exophoria exists.

Specifically, from the eye muscle centers, in effect the ocular motor nerve centers and particularly the center of Perlia, the impulse goes along the fibers of the internal rectus muscles for the convergence. That impulse is always present as tonus, least marked in sleep. When this tonus is increased for contraction necessary for convergence, then, with an abnormal excitation of the sick labyrinth, the synergy of the eye muscles is disturbed.

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NOTES, CASES, INSTRUMENTS

A BINOCULAR TANGENT-SCREEN MALINGERING TEST*

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Convincing demonstration of the functional nature of visual loss in an individual who presents himself with monocular reduced acuity is often difficult. The purpose of this paper is to describe a method by which it is frequently possible to prove the presence of a functional element.

Binocular visual field testing is performed on the tangent screen at one meter in the same manner as routine monocular field testing, but with the sole exception that both eyes are uncovered. It is obvious that in a normal patient, no blind spots can be elicited by this procedure and that, if either eye is normal, the full extent of the tangent screen will be visible.

Routine monocular tangent-screen examination should be done, checking the alleged better eye first. If the fields are not constricted, further field testing is fruitless and other methods must be used. When constriction is present the patient should be checked for tubing which, if present, is diagnostic.

Many individuals with constricted monocular fields will not, however, show tubing. In such a situation binocular field testing may be of great value. The average individual has little knowledge of the exact character of his visual field, either binocular or monocular, and commonly may be trapped by his own uncertainty.

The functional etiology will be revealed by the appearance of a homonymous defect, the inability to demonstrate the blindspot of the alleged normal eye, or appreciable loss of the normal field of the good eye when tested binocularly.

The following cases, with accompanying fields, will demonstrate the typical malingering responses.

CASE REPORTS

CASE 1

Figure 1A illustrates the routine monocular tangent-screen findings of I. N. (UMH-725635), a 24-year-old Negress complaining of vision reduced to light perception only, O.S., considered to be of functional origin. O.D. shows a normal field and blindspot.

The field, O.S., shows marked constriction, which cannot be interpreted as tubing. However, the binocular test appeared as shown in Figure 1B. This illustrates both the characteristic features of a homonymous type of defect on the same side as the "poor" eye and the absence of the blindspot on the normal side. Such an inconsistent response indicates the presence of a functional element.

CASE 2

Another case demonstrating this typical homonymous field defect and the absence of the blindspot is that of O. M. (UMH-744340), a 31-year-old Negro, suspected of malingering. He had a history of an industrial injury with a hot steel fragment producing a peripheral corneal scar, O.S.

The central cornea, media, and fundus were normal. Nevertheless he claimed vision to be reduced to light perception at distance and J14 print for near.

Figure 2A shows the monocular tangent-screen findings which, although suspicious, could not be definitely interpreted as functional inasmuch as the perimeter field was as shown in Figure 2B. Binocular tangent-screen field, as depicted in Figure 2C, shows both characteristic functional findings as described.

* From the Department of Ophthalmology, University of Michigan Medical School.

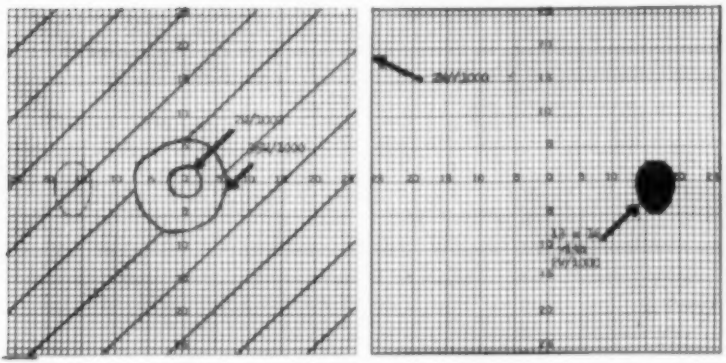

Fig. 1A (Sproule and Havener). Routine monocular tangent-screen findings, Case 1.

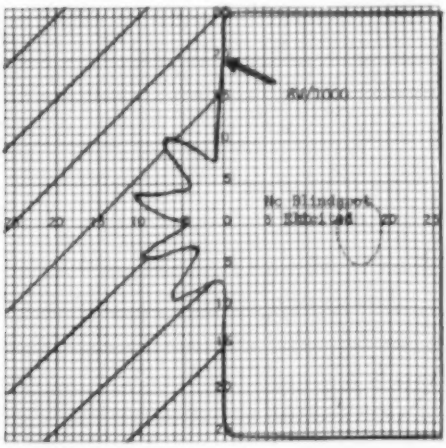

Fig. 1B (Sproule and Havener). Appearance of binocular test, Case 1.

Case 3

Another variation which may be encountered is that of R. M. (UMH-717812), a 40-year-old Negro, suspected of hysterical or malingering reduction of visual acuity to 20/200, O.D.

Figure 3A represents the monocular tangent-screen fields and shows classic-tubing, O.D. The binocular field in Figure 3B shows loss of all the previously normal field, O.S., to approximately the same extent as the tubular field, O.D.

Summary

Binocular tangent-screen field testing has been discussed as a useful adjunct in determining the functional nature of a monocular

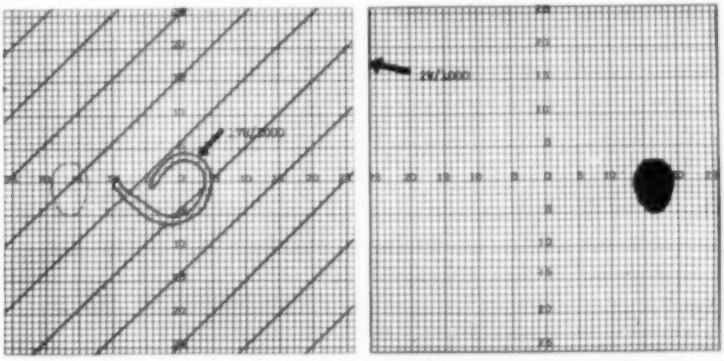

Fig. 2A (Sproule and Havener). Monocular tangent-screen findings, Case 2.

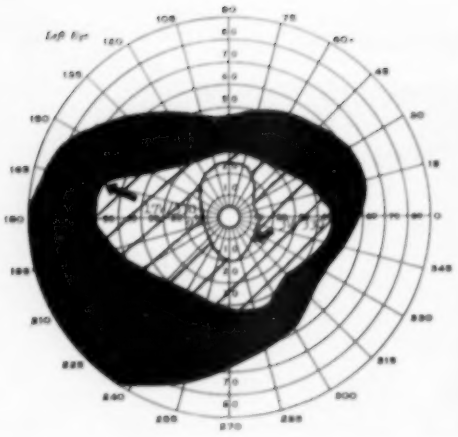

Fig. 2B (Sproule and Havener). Perimeter field of the left eye, Case 2.

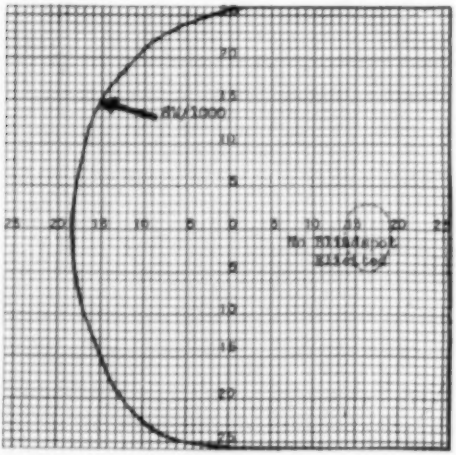

Fig. 2C (Sproule and Havener). Binocular tangent-screen field, Case 2.

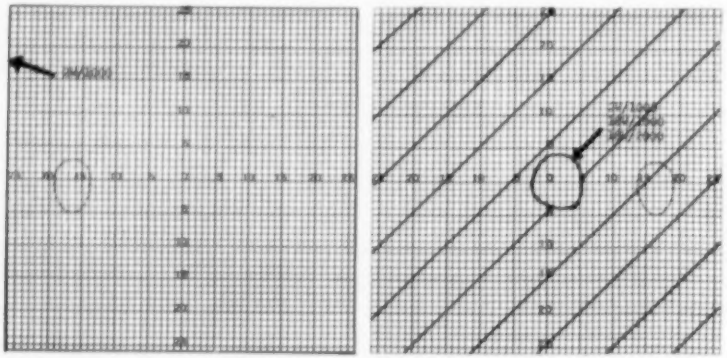

Fig. 3A (Sproule and Havener). Monocular tangent-screen fields, showing classic tubing, Case 3.

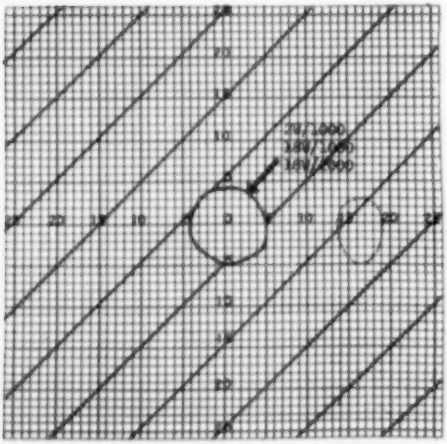

Fig. 3B (Sproule and Havener). Binocular field, Case 3.

field loss. Functional characteristics include homonymous field loss on the side of the "defective" eye, inability to demonstrate the previously elicited blindspot of the normal eye, or other loss of the normal field when tested binocularly.

University Hospital,
Department of Ophthalmology,
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HAND TANGENT SCREEN*

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It is not sufficient in many instances to know only about the central visual acuity of the individual who is being tested. The Snellen chart will give the patient's distance vision and the Jaeger chart will give his reading vision.

If some dysfunction in the central visual field is suspected, a test should be made with a tangent screen. A portable screen for such a test is not always available in the field, aboard ship, or with a flight unit. It is suggested that a hand tangent screen (fig. 1) be carried in the eye chests of the Army, Navy, Air Force, and similar units.

The hand tangent screen illustrated in Figure 1 may also be taken to the patient's bedside, to the home, or hospital, where it would be impractical to transport a large tangent screen. It may be used in any and all conditions—to chart central visual fields, as an aid in diagnosis, and as a diagnostic screening device in the large and busy clinics. It is so compact and light that it can be moved or shipped as easily as a portfolio or notebook.

Fig. 1 (Pritikin). The hand tangent screen.

The patient screen distance is fixed by a horizontal bar 0.25 meter, approximately 10 inches, in length. By exact application of the cheek rest to the patient's inferior orbital rim, perfect alignment and immobility of the head is assured and mechanical raising or lowering is made unnecessary. The device fits each and every patient and time-consuming adjustments are eliminated.

The screen is a flat, dark, nonreflecting metallic or plastic rectangle. The fixation target is centrally placed. It is actually the flattened head of the bolt which holds the vertical portion of the bar frame, thus there are no small parts to be lost or misplaced. Except for the targets and the wand, the whole device breaks down into five parts.

Lines denoting the meridional divisions, as well as the isopters, are grooved into the screen. The physiologic blindspots, one on the right for the right eye and one on the left for the left eye, are designated.

Adequate, even illumination must be supplied, but this is no problem in the modern, well-lighted offices, clinics, and hospitals. Daylight illumination may be used if the patient's back is to the window.

The test object is mounted on a wand which is manipulated by the examiner in the same manner as the wand used with a large tangent screen. Magnetic testing objects may also be used and may be moved along the face of the screen by means of a magnet, further simplifying the procedure. The central field for form or color, using white, blue, red, and green, may be ascertained.

Charting may be made directly on the screen with soft chalk and later transcribed to standard tangent screen charts for permanent records. Soft chalk marks may be easily wiped off with a dry or moist cloth. The wand has a small hole at each end; the smaller hole is for the smaller targets.

The targets furnished are 0.5, 1, 2, and 3 mm. in white, and 2 and 3 mm. in blue and red and green. Central vision charts are also furnished.

Talcott Building.

* Manufactured by The House of Vision, 30 North Michigan Avenue, Chicago, Illinois.

VISUAL FIELD TESTING WITH BINOCULAR FIXATION

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Bakersfield, California

It is the purpose of this paper to present here a method of taking visual fields in which greater accuracy is attained with the use of binocular fixation. This procedure permits rapid, accurate, monocular visual field examination with binocular fixation. The equipment required is simple and inexpensive. It consists of:

1. A light gray tangent screen marked into five-degree areas.
2. A hand projector capable of projecting a small spot of green light.
3. A rheostat, adjustable in order to vary the light intensity of the projector.
4. A source of red light serving as a fixation point behind the center of the tangent screen.
5. A pair of reversible red-green glasses.
6. Charts for recording visual field findings.

The patient is placed at a one-meter distance in front of the fixation light which is directly behind the center of the tangent screen. Red-green glasses are placed on the patient; these will allow the fixation light to be seen with both eyes but the projected test object with only one eye. The fixation light is red and is seen as a bright red source of light by the eye wearing the red glass and is seen as a dull green light by the other eye behind the green glass.

Fig. 1 (Baisinger). Recording chart and projector.

The examiner remains somewhat behind the patient and usually to one side and projects the small intense green light onto the tangent screen. In this way, the only movement noted is that of the projected test object, which is seen only by the eye wearing the green glass.

The amount of light intensity can be varied by the rheostat connected to the projector cable. This permits the finding of very small and relative scotomas. The co-operation of the patient is almost immediate and universal because of the feature of binocular fixation and absence of extraneous distractions.

Mapping out of the normal blindspot and gross field defects can be very quickly and accurately done. A simplified chart has been worked out for recording findings of the tangent screen. The tangent screen itself is divided into five-degree areas beginning with the center of fixation. These notations are duplicated on the recording charts. The entire examination is done with both the patient's eyes open.

To search for large and absolute field defects more intense illumination may be used for the test object. For very transient or indistinct scotomas, the light source of the projector should be reduced to a minimum and the search for these areas continued. The progress of visual field changes may be observed by accurate charting from time to time.

Considerable study needs yet to be done to determine what effect the color values have upon the size of the field. Similar study might also be made using a method of field determination by polarized light for test object and fixation. The use of "black light"

with a fluorescent green test object and red fixation light with red and green glasses has been considered but has not been explored.

It is hoped that, in calling to mind this simple method of doing visual fields, the busy ophthalmologist will be able to do his routine fields more quickly and accurately and, in difficult problems, such as mapping out central or small paracentral scotomas, a more exact method will be available.

2010 17th Street.

PSYCHOLOGIC FACTORS IN REFRACTION

M. H. Presberg, M.D.
Rochester, New York

Although psychologic factors have been discussed for many medical specialties, there seems to be a paucity of literature on the psychologic factors involved in refraction. A large percentage of refraction patients are referred because of headache which is thought to be due to refractive errors. In such cases, it is almost gratifying when hyperopia associated with esophoria is found. More often, however, the patient is a high-strung, tense individual who may even recognize the emotional origin of some of his symptoms. In such persons, emotional reactions are likely to play a large part in the eye examination.

In refraction, already tense patients, who during the examination must make many rapid decisions, may suffer frustration and emotional trauma. Even in the most basic tests, motivation is a factor to be reckoned with. How often there is evidence of psychologic disturbance when visual acuity is merely checked and frequently patients are seen who wish to give the impression that their vision is poor. Malingering tests may be needed to demonstrate the true status of the visual acuity.

One type of problem patient is the one who abhors making mistakes and is obviously embarrassed when a letter is read incorrectly. Such a patient may be very trying when he has to choose between two letters, neither of which is sharply defined. He may refuse to make a choice, or if the choice is obvious (say the first letter) he will make that choice, and from then on he will always make the same choice.

In such cases, a more accurate response may be elicited by never repeating the same numbers. For example, one asks which is better the first or second; repeating the tests, one now asks which is better the fourth or fifth, or the eight or ninth, and so forth. Thus, the patient does not lose face by saying one time that the first is better and the next time that the second is better.

Occasionally, especially in patients with limited educational opportunity who seem to feel that the examination is an intelligence test, a defensive attitude may be noted from the beginning. When such a patient is urged to read the letters and mistakes are pointed out, he may become antagonistic. The presence of a relative makes the examination even more difficult; the patient may be willing to show his ineptness to the examiner but it is too humiliating to show it to a relative.

One of the most interesting patients is the one who, basically insecure, refuses to venture a guess. Such a one stands out in my mind. He was asked to read the chart. This he did up to the 20/30 line. All of these letters were read accurately. Beyond this line he would not venture. We know from experience that each letter in the alphabet can be resolved with more or less ease. If he could read all of the 20/30 line he should be able to read the simpler letters on the 20/25 line but he could not be made to read any letter beyond 20/30.

When he was asked to guess he refused on the grounds that it would not do any good to read them incorrectly. When I explained that I learned from his mistakes, it made no difference. No amount of explaining would get him to try beyond the point at which the letters were quite obvious to him.

Questioning revealed that, although this

patient was a good business man, his inability to venture into the unknown had plagued him all his life and had stood in the way of his attaining outstanding success.

Another type of insecurity is demonstrated by the patient who always wants to make a choice between a very good lens and one which blurs the print beyond recognition. Such choices fill him with pleasure and the examination is very satisfying to him. However, as the ultimate refinements approach, he frequently has to choose between two letters neither of which is acceptable.

Now a crisis is at hand. The patient feels that one of these two lenses may appear in his final correction. Since neither one is any good, if he commits himself he may end up with a pair of glasses through which he cannot see. No response is forthcoming. It may be necessary to go back to markedly contrasting lenses to get the patient into a co-operative mood. To explain the nature of the test may be of no avail and one may have to settle for an axis or sphere that is just close to optimum.

Responses of patients are frequently predictable. Although many unmarried persons can and do make good adjustments to their environments, I have found that spinsters and bachelors may be particularly difficult. Their set ways are reflected in their responses. Soon, varying their decisions may produce considerable emotional turmoil. Young people are certainly much easier to handle.

One of the biggest stumbling blocks in refraction is the question of what constitutes a better lens. It should be made clear to the patient what one is looking for. The form of the letter is more important than its size, blackness, or contrast. We all have experienced frustration when the willing patient keeps picking the better and better lens until he can no longer read any of the letters.

In some ways the examination techniques contribute to the problem. In order to differentiate between lenses, a technique called "threshold study" is used. This can be done either by reducing the illumination to the point at which the patient can barely perceive the letter or by reducing the size of the letter to the point where it can just barely be made out. Using letters above threshold produces inability to differentiate quarter-diopter changes with any degree of certainty. Thus faulty technique may contribute to the insecurity of the patient.

Because of these psychologic difficulties, many methods of examination should be used. The examiner should realize that there is a time when he must abandon one technique in favor of another.

The Lancaster dial is a rapid and efficient method of determining axis and strength of cylinder. Even though the cross cylinder can refine the axis to within two or three degrees, a stubborn patient with a pathologic personality may have to settle for a cylinder within five to 10 degrees of the optimum position. Very often I abandon the refractor for the trial case so that the changes will not come in such rapid succession as to overwhelm the patient. I have also found that doing several retinoscopic examinations and averaging the results may satisfy those patients to whom we refer as having "cerebral stenosis."

The examiner may find that he is contributing to the turmoil of the refraction. If he is impatient or hurried, he may be forced to slow down. A word of encouragement and a calm, easy-going manner will do much to facilitate his work. Perfectionism, a quality which patients expect in a refractionist, may work against a good result in some patients. One must know when to back down and compromise on some small point to preserve the patient's ego for the ultimate good.

An attorney, who has been particularly difficult to refract, wrote the following statement which crystallizes some of the thoughts I have tried to express:

"It seems unusual but nevertheless true that I cannot be intelligent or responsive in a doctor's office. I want to be so right that I usually am wrong. I seem to freeze when I

should relax. I am afraid that I am not giving correct information and I get clammy all over, perspire, and I'm certain that my blood pressure increases. . . . I believe that I am that way because of my profession which requires me to be right or suffer the consequences."

The reactions of refraction patients must be understood and anticipated. The examiner must be sympathetic and give the impression of competence. He must be ready to vary his technique when an impasse is reached. A refractor may prove to be a very traumatizing instrument because the patient is confronted with many rapid changes without adequate rest. There must be willingness on the part of the examiner to compromise and not press his patient beyond that delicate point of perfection which, after all, may be of theoretic interest only.

35 Chestnut Street (4).

BILATERAL ECTOPIA LENTIS IN A DWARF*

NATHANIEL C. WOLLIN, M.D.
Cortland, New York

AND

NORMAN YOURISH, M.D., AND
ARTHUR NATHANIEL, M.D.
New York

The association of dwarfism with bilateral spontaneous dislocation of the lenses has rarely been noted in the literature, therefore this case report seems justified.

CASE REPORT

Our patient was a 67-year-old Negress with both lenses totally dislocated into the vitreous. When examined by the staff endocrinologists and internists she was said to be "a genetic eumorphic type of dwarf with secondary changes due to rickets, resulting in infantile rather than adult proportions." Her total height was 47 inches; her arm span was 53 inches; and her weight was 79 pounds. However, she was not a rachitic dwarf. The patient did not increase in height after the age of 12 years. Her menstrual and marital histories were normal.

Ocular history. The patient remembered no ocular difficulties during her childhood. During her early adult life and middle years she had to hold reading matter very close. Five years ago she lost her ability to see well. No specific statement as to the time of the visual loss could be elicited and it was probably gradual. There was no history of ocular injury or trauma to the head.

Family history. The patient was short (47 inches) although symmetrical in her development. Two of her sisters were five feet five inches and five feet three inches, respectively, and had no known ocular difficulties. Two of her three children were about five-feet tall; one being four feet 11 inches; the second, five feet two inches, and the third, five feet seven inches to 5 feet nine inches.

The shorter of the two daughters was a high myope (−14D., O.U.). On examination she was found to have a marked bilateral peripapillary atrophy. She also had an elliptic, dark, pigmented area at the left macula, possibly a Fuchs' pigmented spot. The patient's husband was five feet five inches tall and was myopic. All his brothers and sisters were taller than he and were of average height.

Eye examination. Vision: O.D., hand movements; O.S., counting fingers at two feet with a +10.0D. lens. Both corneas were hazy and there was bilateral iridodonesis. Finger tension was increased bilaterally at the first examination.

Tension (Schiøtz): O.D., 42 mm. Hg; O.S., 29 mm. Hg.

Biomicroscopic examination. O.D.: The cornea was edematous. Many fine pigmented keratic precipitates were present on the endothelial surface. A heavy flare and heavy vitreous opacities were noted at the initial examination. O.S.: There was corneal edema

* From the Department of Ophthalmology, Goldwater Memorial Hospital, New York, service of Dr. Sidney A. Fox.

as well as a fluid vitreous and heavy vitreous opacities.

Ophthalmoscopic examination. O.D.: The lens was completely luxated into the vitreous but was not seen. The retinal reflex was poor and the retinal details were obscured because of heavy vitreous opacities. O.S.: The lens was observed floating freely in the vitreous and moved with any alteration in the position of the eye. Severe chorioretinal peripapillary atrophy involving the circumpapillary area and the macula was noted.

Course. O.D.: The patient's ocular hypertension did not respond to miotics but was normalized with atropine and cortisone. This apparently was a glaucoma secondary to uveitis. On prolonged therapy, over a two-month period, the flare and corneal haze cleared slightly and there was some absorption of vitreous haze, permitting the lens to be observed floating in the vitreous in the inferonasal meridian. O.S.: The tension was never noted at as high a level as in the right eye and was readily controlled by miotics.

Discussion

The patient represents an entity not frequently discussed in the literature. She is a genetic type of dwarf, symmetrical in her development, with the unique feature being the bilateral dislocation of the lenses. The peripapillary and macular chorioretinal atrophy noted, O.S., is probably myopic in origin, and the uveitis and glaucoma are attributable to the irritation of the ciliary body by the luxated lens.

Duke-Elder[1] mentions the occurrence of ectopia lentis in dwarfism. In a series of cases of Marfan's syndrome surveyed by Weil[2] that author mentions the cases of two female dwarfs who had bilateral ectopia lentis. These patients were 147-cm. tall. Both had sparse hair on their heads and one was bearded. One had a child with arachnodactyly. Both had sclerosis and arthropathy and one had stubby clubbed fingers. The description suggests the possibility of an endocrine dysfunction.

We were able to examine one daughter (four feet, 11 inches), from whom we obtained most of the family history. She was a high myope (−14D.) and had marked peripapillary atrophy bilaterally and a Fuchs' spot, O.S. Her lenses were normal in shape and the zonules were not visible on biomicroscopic examination with the dilated pupil. In the patient herself we were never able to ascertain the size and shape of the lenses since they were already dislocated into the vitreous at the time of the first examination.

Marchesani[3] suggested that there is a definite relationship between the lens and growth anomalies. He described spherophakia and subluxation of the lens as part of a syndrome accompanied by brachydactyly, short stature with broad chest, heavy muscular build and brachycephaly. Myopia has also been mentioned as part of the syndrome.

In a recently published paper, Probert[4] has mentioned the possibility that a patient might develop an incomplete form of Marfan's or Marchesani's syndrome. Our patient may fall into this group.

Summary

A case report is presented of a genetic type of dwarf with spontaneous bilateral total dislocation of the lenses, uveitis, and secondary glaucoma. Two of her offspring were short and one was known to have high myopia. Pertinent literature is reviewed and cited.

43 North Church Street.

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ELECTRICAL CONTROL ASSEMBLY FOR SLITLAMP BIOMICROSCOPE*

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Philadelphia, Pennsylvania

The intravenous fluorescein test of Amsler and Huber,[1] in which the gradual appearance of the dye in the anterior chamber is followed with the slitlamp biomicroscope, has apparently not become popular in the United States, even though the technique may provide useful information on the rate of aqueous-humor formation.

One of the difficulties seems to be the assembling of the proper electrical apparatus for controlling and measuring the intensity of the slitlamp current. A suitable combination unit (fig. 1) was constructed at this laboratory for the Goldmann slitlamp.

The adjustment of current flow through the slitlamp is accomplished by the use of a variable transformer rather than a rheostat, thus affording a much finer and more efficient regulation. A voltmeter indicates the output voltage and an ammeter registers the slitlamp current. The meters are illuminated from within, and a small rheostat permits adjustment in order not to interfere with the observer's dark adaptation. Fuse protection is provided for the slitlamp bulb and wiring.

The controls on the panel include: (a) the main off-on switch, (b) the slitlamp control knob, (c) a selector switch permitting use of either the slitlamp or any auxiliary low-voltage hand instrument, (d) a "booster" switch allowing increase of about 15 percent over the ordinarily available voltages, and (e) a rheostat knob for controlling brightness of the meter lamps.

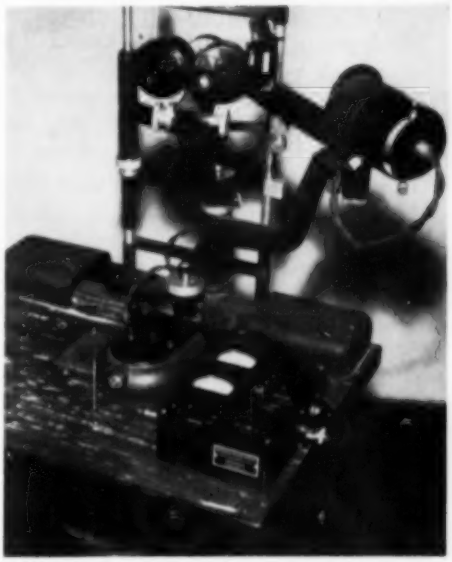

Fig. 1 (Askovitz). Electrical control for slitlamp.

Outlets on the top are special jacks for the slitlamp and a pair of ordinary tip jacks. Receptacles are provided so that all the necessary connections may be made in a few moments without any tools. The entire control assembly, contained within a Bakelite case less than 7.0 by 5.5 by 2.5 inches in size, fits conveniently on to the slitlamp table. (If variations in the voltage supply should present any problem, the cord may be plugged into a voltage stabilizer rather than directly into a wall outlet.[2])

York and Tabor Roads (41).

* From the Albert Einstein Medical Center, Northern Division, Ophthalmology Research Laboratory (Dr. I. H. Leopold, Director). This work was made possible by a grant from the Weinstock Fund. The whole assembly will be manufactured by Medico Instruments, 1100 West Wyoming Avenue, Philadelphia, Pennsylvania.

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BLINDNESS FROM MULTIPLE PTERYGIUMS IN AN ALASKAN NATIVE

MILO H. FRITZ, M.D.
Anchorage, Alaska

The purpose of this paper is to show that, even in the modern United States and its territories, it is possible for an individual to become blind from what would be an easily remediable condition if recognized early by any competent opthalmologist and treated according to well-known precepts.

In May, 1951, word was received in my office that there was a man "blind with cataracts" at Pedro Bay on Lake Iliamna some 180 air miles southwest of Anchorage.

Since I was the only ophthalmologist practicing in the territory at that time, such requests were quite common.

Since 1947, it had been established that the leading cause of loss of vision among Alaskan natives was corneal scarring from the recurrent attacks of phlyctenular keratoconjunctivitis.* Almost always the corneal scars were described as cataracts. Therefore, when authority from the Alaskan Native Service was obtained to bring this patient in, I was somewhat surprised at the findings. I found trichiasis and distichiasis of a mild degree on both upper lids with some mild corneal scarring resulting therefrom. There were also a few peripheral corneal scars characteristic of those caused by repeated attacks of phlyctenular keratoconjunctivitis. However, the most striking finding and the cause for the extremely poor vision, O.D., 2/400; O.S. 4/400, was the presence of

Fig. 1 (Fritz). Multiple pterygiums in an Alaskan native.

three pterygiums. The one on the right eye, originating temporally, had grown completely across the cornea to the nasal limbus. The two on the left eye had originated, respectively, nasally and temporally, meeting in the midline of the cornea forming a somewhat butterfly effect.

The patient was 61 years of age and apparently a full-blooded Eskimo, although his name suggested Russian blood, perhaps many generations back, which is a common thing along the routes of early Russian colonization of Alaska. His physical findings and laboratory work-up disclosed nothing worthy of note other than what has been described. He had worked intermittently in a cannery up to five years previously and had been given various ointments by itinerant nurses and doctors from time to time.

In order, at best perhaps to improve vision or at worst to preserve what was left, all offending lashes were removed by high frequency current. Then all three pterygiums were transplanted upward according to the technique of McReynolds. All of these procedures were done on July 6, 1951.

Convalescence was uneventful but vision was unimproved and on September 10, 1951, the patient was taken home by plane and by letter stated that he was able to get about the house and yard and "if slow, around downtown" . . . in Pedro Bay.

1027 Fourth Avenue.

* Fritz, M. H. Thygeson, P., and Durham, D. G.: Phlyctenular keratoconjunctivitis among Alaskan natives. Am. J. Ophth., **34**:177 (Feb.) 1951.

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SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

February 1, 1954

DR. BERNARD FREAD, *President*

UVEITIS, GLAUCOMA, AND OPTIC NEURITIS

DR. M. H. COHEN presented a case showing an association not commonly recognized or reported—uveitis with optic neuritis. The patient was a 27-year-old white man, in otherwise excellent health, who presented himself for examination on January 2, 1953, primarily because of the sudden onset of a marked blurring of the left eye eight days before. Previous history of ocular disease was negative except for some questionable and vague disturbance of vision in the same eye for the past three months. There was no history of trauma antecedent to the onset of the blur, and there had been no improvement in the vision of the left eye in the eight-day interval. Family ocular history was noncontributory.

Examination revealed a normal right eye with a vision of 20/15. Tension was 19 mm. Hg (Schiøtz). The fundus revealed a moderate blurring of the nasal disc border and a yellowish haze over the papilloretinal area; a good cup but no venous pulse was noted.

The left eye was white and except for the blur was asymptomatic. Vision was 20/60 correctible to 20/50 with pinhole. The fundus revealed a disc very similar to that of the fellow eye with a smaller cup and no venous pulse. Extensive examination under maximal mydriasis with 10 percent neosynephrine revealed no evidence of retinal or choroidal disease to explain the visual loss.

Slitlamp examination revealed a two-plus flare, several floaters, no keratic precipitates, no evidence of posterior synechias, or any other signs of anterior-segment disease. Transillumination was normal. Tension was 40 mm. Hg. No photophobia was present. There was no ciliary tenderness but there was pain on retropulsion of the left globe into the orbit.

Visual field examination revealed a fairly dense area which reached to within eight degrees of fixation, with a relative central scotoma for 1/2,000 white involving fixation.

Re-examination of the tension after maximal dilatation revealed a drop in pressure. Homatropine was prescribed for instillation at frequent intervals. The following day, the tension was 15 mm. Hg, visual acuity was 20/40, and the visual field showed a beginning recession of the relative central defect. Atropine was substituted for instillation at this time.

Four days later, the central defect had completely receded, but the paracentral dense area remained, vision was correspondingly 20/25, the aqueous no longer showed a flare, and only an occasional floater was present. The tension was 19 mm. Hg, and the eye had remained white.

Four weeks later, a venous pulse appeared on the disc of the left eye where none had been present before, visual acuity was 20/20, tension 27.5 mm. Hg, aqueous was clear, and the patient had no complaints. During the succeeding months the flare reappeared intermittently and atropine was used in the same manner as noted. The tension varied irregularly during this period between 19 to 29 mm. Hg. At the present time visual acuity is 20/25, tension 25 mm. Hg, the paracentral defect remains, the eye is white, and the patient is symptom free.

Of the many diagnostic possibilities which present themselves, the most likely diagnosis appears to be uveitis with secondary glaucoma and optic neuritis. Among others which have to be taken into consideration are: Optic neuritis, optic neuritis with chronic simple glaucoma, optic neuritis with glaucomatocy-

clitic crises, chronic simple glaucoma with uveitis, and so forth. Dr. Cohen said that it was his impression that this was a case of low-grade uveitis with secondary glaucoma and optic neuritis. Perusal of the literature revealed a total of approximately 25 similar cases. The last reference to such a case was made by Fry in 1938.

Discussion. Dr. Samuel Gartner said that finding uveitis with optic neuritis is very rare for the ophthalmologist but for the pathologist, it is a very common finding. On examination of globes that have extensive uveitis, it is common to find inflammatory changes of the optic nerve. In most cases of uveitis, this is missed because the media are clouded and the doctor is not aware that the optic nerve may be involved. It would be well to watch for this condition. Pathologically, it is a very common finding.

Dr. London: was any medication used besides homatropine and atropine?

Dr. Kornzweig said that the diagnosis of uveitis was apparently based only upon the presence of a flare in the aqueous on the first day. No keratic precipitates and no other evidence to support the diagnosis of uveitis were found. Dr. Kornzweig said that he was just questioning whether there was enough evidence for that diagnosis?

Dr. Cohen thanked Dr. Gartner for his comments. He was aware that pathologically many such cases with uveitis are seen. In answer to Dr. London, no other medication was used. In answer to Dr. Kornzweig, the response of the tension to atropine was one strong point in favor of the presence of uveitis. The flare and the floaters reappeared intermittently and with each reappearance, atropine was given and the flare and floaters disappeared.

Molluscum contagiosum of eyelid*

Dr. Brian J. Curtin and Dr. F. H. Theodore said that molluscum contagiosum is one of the most easily overlooked causes of chronic unilateral conjunctivitis refractory to routine treatment. Not only do the inciting lid lesions vary greatly in morphology but the secondary ocular inflammation, due to the desquamated virus material, assumes a number of distinct clinical forms. Papillary and follicular conjunctivitis, punctate epithelial keratitis, and pannus can be found in a variety of combinations. Primary nodules of both conjunctiva and cornea may also occur.

Discussion. Dr. Kornzweig asked if it is necessary to excise the molluscum or is it just as good to incise and scrape out the molluscum?

Dr. Minsky said that, for a long time, he had noted that a molluscum situated at a distance from the ciliary border will be a cause for a mild, follicular conjunctivitis. In the past the lesions were never excised; the molluscum was expressed and the area was touched with tincture of iodine. That almost inevitably cured the conjunctivitis.

Dr. Curtin stated he may have used incorrect terminology. The lesions actually were incised—incised and expressed, they were not excised in the strict sense of the word.

Coats' disease†

Dr. Isadore Givner said that, in 1908, Coats described cases of "retinal disease with massive exudations." He believed the original change to be hemorrhages in the deeper layers of the retina. He divided the cases into two groups: (1) Those in which there is no vascular disease; (2) those in which marked vascular changes are present.

The disease occurs mostly in young persons and affects only one eye. In a few cases bilateral involvement has occurred. The disease progresses slowly and in children may be called to attention by the development of a strabismus. The cornea, anterior chamber, iris, and lens are normal early in the disease. The vitreous usually does not but may show opacities. Characteristically a white or yellowish-white exudate in the retina is found, usually in the posterior portion of the fundus, near the disc and macula.

* This paper was published in full in The Journal, **39**:302 (Mar.) 1955.

† This paper was published in full in The Journal, **38**:852 (Dec.) 1954.

The course is usually progressive. Hemorrhage into the vitreous may precede a retinitis proliferans. Later, the retina detaches and resembles a pseudoglioma. Cataract formation, iritis, and occasional changes in the tension may ensue. Pathologically, connective tissue between the choroid and retina occurs.

Duke-Elder mentions some cases of an inflammatory nature as due to syphilis, tuberculosis, and other infections. It would seem to me that when vascular anomalies occur without evidence of inflammation, the condition should be considered Coats' disease. However, when exudates occur in the absence of vascular anomalies, and a specific cause for the inflammation can be found, the condition should be described by its etiologic cause as "luetic retinitis exudativa."

Dr. Givner then presented two cases of Coats' disease.

Electric burn of eye and adnexa

Dr. Isadore Givner said that on April 20, 1949, P. E., a man, aged 38 years, fell on the third rail of the I.R.T. while at work, hitting his right eye.

Examination disclosed the right eye to have no light perception. Both the upper and lower lids had a third-degree burn. The lids were adherent to the globe. In the occipital region was an associated scalp burn. By May 4th, the cornea was sloughing, exposing the iris, and both lids were sloughing off.

An evisceration was done on May 12th. The anterior half of the globe was cut off and the inside of the eyeball was filled with a blood clot. A vaseline pack was put in and the eye bandaged. By May 16th, granulations were growing in over the exposed right superotemporal portion of the malar bone. There was no periosteum present. Balsam of Peru was applied to stimulate granulations. By May 27th, the skin was growing in from all sides.

A month later, new skin had completely grown in. The remnant of the conjunctival sac varied from 12 mm. vertically in some areas to six mm. in its nasal portion. The width was 24 mm. Both punctae were still intact.

Morgagnian cataract

Dr. Isadore Givner said V. S., a 63-year-old man, had noticed failing vision of his right eye for the past 10 years. Examination disclosed a hypermature cataract (morgagnian) with faulty light projection. Vision in the left eye was 20/30 and the eye was normal throughout.

If the patient looked up, the cataract appeared white. If the patient looked down, the cataract was brown, due to the nucleus coming to lie just beneath the capsule in a fluid cortex.

Corneal findings in ichthyosis

Dr. Benjamin Friedman said the corneal changes in ichthyosis may be divided into those which cause symptoms and those which are clinically silent. The painful types of the disease are characterized by the formation of nodules on the cornea and are relieved by removal of the offending lesions. The asymptomatic cases show changes in the corneal nerves in addition to grayish, irregular opacities in the superficial corneal stroma.

A hitherto undescribed form was presented. This consisted of innumerable circular grayish opacities in the posterior corneal stroma. The greatest concentration was present centrally, where the opacities extended forward halfway through the parenchymal thickness; peripherally, they tapered down to a barely discernible thickness at the limbus. There was no appreciable loss of vision.

Bilateral lacrimal-gland tumor

Dr. Benjamin Friedman said the patient was a 33-year-old Negress who exhibited tumors of both lacrimal glands. Biopsy revealed characteristic sarcoidosis. The case is unique in that all other laboratory and clinical data were negative.

Epidemic keratoconjunctivitis

Dr. Julius Schneider, Dr. M. Feld-

STEIN, AND DR. A. L. KORNZWEIG said that an outbreak of epidemic keratoconjunctivitis involving 16 patients occurred at Kingsbridge House. The incubation period was at least nine to 16 days. The ages of the patients ranged from 69 to 94 years, and there were two females to each male. All but two of the cases were bilateral.

Clinically there was variable edema of the lids and conjunctiva with injection, mucosal redundancy, and follicular hypertrophy. In three instances the discharge was serosanguinous. Adenopathy was a minor finding. Two patients had pseudomembranes and one had true membrane formation followed by residual scarring of conjunctival fornices.

The corneal lesions started as superficial punctate staining lesions, followed by round subepithelial opacities. Six patients still had corneal lesions after seven to 12 months. The final vision in all instances returned to the original level.

Treatment was with antibiotics, cold compresses for congestion and edema, and cortone ointment for corneal lesions. The impression is that treatment did not alter the course of the disease in these patients.

Discussion. DR. KORNZWEIG commented that the interest in this particular epidemic was in:

One, the fact that it could be stated with some degree of certainty that the incubation was at least nine days. All possible information of this nature should be collected.

Secondly, a large institution was involved. It is possible that the epidemic could not have been controlled. These patients were all isolated immediately when the outbreak occurred. The important thing to bear in mind is that this outbreak could be limited.

MARFAN'S SYNDROME

DR. DANIEL KRAVITZ presented a patient, A.S., female, aged eight years. She was one of several members of a family having Marfan's syndrome who have been under his care for a number of years.

He said that the first member of the family, I. S., brother of A. S., was brought to him in May, 1943, at five years of age. He had all the classic signs of Marfan's syndrome, including dislocated lens in both eyes. He was having serious visual difficulties because, at times, one or both lens receded upward so that he would see through the aphakic portion of the pupils. At other times, he would see through the lens portion so that he was considerably confused.

Because of the objection of the father to operation on both eyes at the same time, discission of the right lens was performed on May 18, 1943, and on the left on August 31, 1943. A second operation was not necessary. Vision on December 24, 1953, was: R.E., 20/20 with 13.0D. sph.; L.E., 20/25 with a +13.0D. sph. ⌒ +1.0D. cyl. 90°. By pulling the spectacles down on the nose, he was able to read J1 without difficulty.

M. S., the father of the two children, aged 45 years, also had dislocated lenses and, at the age of 17 years, was so annoyed by the changing vision that he entered a hospital for operation on the right eye. Vision in that eye is 20/20 corrected. The left eye was never operated upon and the lens is drawn upward quite high, so that vision in that eye is 20/30+ with a +14D. sph.

The father's brother, G. S., aged 52 years, also had dislocated lenses. At the age of 34 years, they suddenly dropped and gave him considerable trouble. Both eyes were operated upon and the lens removed. Vision in his right eye is 20/20, the left eye was lost because of loss of vitreous and subsequent detachment of the retina.

G. S. fathered three children, two girls and one boy. Both females have normal eyes. The son, M. J. S., aged six years, had dislocated lens and both eyes were operated upon by me on June 3, 1953, with very satisfactory results. Vision in both eyes is 20/40−, corrected. The pupillary areas are fairly clear, especially in the right eye, and further improvement is expected.

An accurate antecedent family history could not be obtained because the two brothers emigrated to this country at an early age. They remember that the grandfather on

the mother's side wore very thick glasses. Of the grandfather's five children, the two males wore heavy glasses, the three females seemed to have normal eyes. One of the males, the father of M. S. and G. S., fathered four children, only the two males had dislocated lens so that the patient here presented (A. S.) is the only female with dislocated lens, as far as the parents know. However, this may not be strictly accurate.

The problem with A. S. is that she is troubled with changing vision. At times, she looks through the lens portion of the pupil and, at such times, she has 20/40+ in the right eye with a +2.0D. sph. ⊂ −8.0D. cyl. ax. 180°, and 20/40− in the left eye with a +1.0D. sph. combined with a −4.0D. cyl. ax. 180°. When the lens moves upward she takes a +13.0D. sph. ⊂ +1.0D. cyl. ax. 180°, to give her 20/30 vision in both eyes.

The question here is, in view of the excellent results obtained in her brother and cousin, whether operation should be performed now, in spite of the good vision, or whether it would be better to wait and take a chance of glaucoma developing, as happened to her uncle.

Discussion. Dr. Glass asked what exact operative procedures were used in these cases?

Dr. Minsky, asked to comment, replied that he did not think he could give an answer to Dr. Kravitz's question. He said each case had to be judged individually and his tendency is to be conservative. He said he would not like to operate on this case unless he had to.

Dr. Kestenbaum said that, at present, he thinks it would be better not to operate but to give the child the two pair of glasses.

Dr. Laval said that he has had to solve this problem many times. He has not operated on any of the cases, as yet. They become aphakic spontaneously and sometimes are not aphakic. He cannot see the necessity for constant aphakic correction.

Dr. Kleefeld said he believed these operations are very dangerous and it is better to use one or two pair of glasses.

Dr. Kravitz summed up by thanking all the discussers and saying that, in several cases of glaucoma in Marfan's syndrome, emergency operations had given very poor results. In other cases lenses have been extracted with poor results. It is not easy to remove the lens in a case of this kind.

Dr. Kravitz said he was inclined to be conservative because he had been fortunate with the other two children. He was forced to operate because something was beginning to happen to the lenses. At present, the child here reported does have two sets of glasses.

Bernard Kronenberg,
Recording Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology
December 17, 1953

Burton Chance, M.D., *Chairman pro tem*

Malignant glaucoma

Dr. P. Robb McDonald presented the case of a 50-year-old white man who was admitted to the Wills Eye Hospital with a diagnosis of narrow-angle glaucoma of the right eye of 10 months' duration. The tension had been adequately controlled until a few days before admission. The diagnosis had been made on routine examination, and there was no history of an acute attack. The vision was 6/9, with correction, in both eyes. Gonioscopy revealed a narrow angle in both eyes and numerous anterior synechias in the right eye. The tension in the right eye could not be reduced below 30 mm. Hg (Schiøtz).

An iridencleisis was performed on the right eye and the following day acute glaucoma developed in the left eye. This was not controlled with miotics, so a peripheral basal iridectomy was performed. The postoperative course in both eyes was stormy with tension ranging from 26 to 63 mm. Hg (Schiøtz).

An intracapsular cataract extraction without loss of vitreous was performed on the

right eye. The chamber remained shallow but the tension was controlled.

The left eye remained fairly well controlled for a time and then cyclodialysis was performed. This functioned temporarily and was followed by an Elliot trephining operation which controlled the tension for four months. The lens in the left eye was finally removed intracapsularly, again without loss of vitreous. The postoperative course in this eye was uneventful. The chamber has remained of moderate depth and the corrected vision is 6/60. The vision in the right eye has been maintained at 6/12 with correction.

The tension in both eyes has remained within low normal limits for six months.

Discussion. Dr. I. S. Tassman: The emotional state of the patient can be an important factor in the occurrence of glaucoma in the second eye. It was indicated in the paper that this patient was emotionally disturbed. I have seen cases in which an individual was operated on for glaucoma in the one eye and developed an acute attack in the second eye before discharge from the hospital. In another instance, the patient suffered an acute attack of glaucoma in one eye while still hospitalized after removal of the gall bladder. The worry, concern, and disturbed emotional state in connection with the first operation was a prominent manifestation here also.

Dr. P. Robb McDonald: This patient was not very emotional until the day after operation when I took the bandages off, and he suddenly realized he could not see a thing out of either eye. He said, "Doc, what's the matter with my good eye?" I think all of us would be rather upset. The only reason he refused miotics at different times was because he said they caused him severe pain, and we switched from pilocarpine to prostigmine. I think the only drug we did not use was DFP.

This case had a very definite characteristic course. There are a lot of cases of glaucoma that have been operated on that do not do well, but this one was obviously the malignant type, and it was not cured until the patient's lenses were removed. I think I could have saved the patient quite a bit of anguish and probably myself a little bit, if 48 hours after the tension went up in the left eye, I had been bold enough to remove the lenses. I have had four or five of these cases now. Fortunately, they all had been patients of somebody else. Sometimes, it is a little easier to handle a case that somebody else is having trouble with than one of one's own.

Surgical management of intermittent exotropia

Dr. Robert D. Mulberger reviewed the nomenclature, etiology, and methods of examination as they apply to the surgical treatment of intermittent exotropia.

A small series of 24 cases, treated by surgery, were reported. Twenty of the 24 patients had a bilateral recession of the external rectus muscles to the equator; 92 percent of all cases were improved by surgery.

Dr. Mulberger advocates bilateral external rectus recession to the equator in most cases of intermittent exotropia.

Discussion. Dr. William E. Krewson, 3rd. Intermittent exotropia is a definite entity which is encountered much more frequently than is generally realized, as intimated by Dr. Mulberger. Its great frequency is unrecognized because these patients have a manifest exotropia at times and exophoria at other times, and change rapidly from one phase to the other. This intermittent type of exotropia is actually the so-called divergence excess, although many other terms have been used in its description. It is characterized by the following findings:

Marked exophoria for distance, which on occasions becomes exotropia, excessive prism divergence (overcoming base-in prisms), normal prism convergence, normal muscle balance for the near point, normal convergence at the near point, normal rotations, and diplopia, when present, comitant both to the right and to the left.

These patients seldom have amblyopia, the vision usually being equal in the two eyes. Alternation is not uncommon. Following di-

vergence, diplopia may be encountered and then foveal suppression develops as the case progresses; later even peripheral fusion may be lost.

It is sometimes possible to demonstrate normal retinal correspondence when the eyes are in alignment for near, and abnormal retinal correspondence when the eyes are divergent for distance. Secondary convergence insufficiency, that is, divergence for the near point, apparently occurs in about one fourth of the cases, especially, as the presbyopic age is approached. Such changes not infrequently are the final stage in the evolution of well-established, or constant, alternating exotropia.

Dr. Mulberger is to be congratulated on the excellent results he has obtained in his series of cases. He has applied the procedure, probably believed by the majority of writers to be the most efficacious; namely, bilateral recession of the lateral rectus muscles. Except in the five clinic cases he mentioned, the same surgery was performed regardless of the amount of divergent deviation.

I agree that no certain operation will give a fixed amount of correction. In my experience, however, although I have no statistics at this time, larger deviations, especially in well-established cases, must have the bilateral recession of the lateral recti supplemented by a resection of one or both medial recti, as well. Also, when secondary convergence insufficiency occurs, the patient, although still an alternator, tends to fix with one eye, and in these cases probably a recession of the lateral rectus and a resection of the medial rectus of the deviating eye is the first step. Not infrequently they require additional surgery on the remaining eye, and even then are sometimes difficult to correct.

Apparently Dr. Mulberger's series did not include any such cases, since all of his patients were under the presbyopic age, although it may be encountered at any time in life.

Vertical deviations, when encountered, are often more marked for distance than for near in cases of intermittent exotropia. It is generally supposed that these are functional, and secondary to suppression. If they are greater than two diopters, however, I believe their correction is definitely indicated.

Orthoptics was not included by Dr. Mulberger in the treatment of his cases, and his results justify this elimination. All too often, however, suppression is deeper than appreciated and its preoperative removal is certainly an advantage. From a practical standpoint, of course, orthoptic training can be effective only in early cases, and in those of small deviation. Postoperative improvement of amplitude is very helpful, however, if it can be obtained.

In the majority of cases, surgery, as Dr. Mulberger has pointed out, is the method of choice. It is especially effective when applied to the very young child who has not yet developed the patterns of foveal suppression and who is too young for orthoptic evaluation and treatment.

Experimental intraocular infection with mumps virus

Dr. H. P. Kirber and Dr. Marie W. Kirber presented a paper on this subject:

Epidemic parotitis is a virus infection which usually attacks glandular tissue. It is of interest to the ophthalmologist because of its ocular complications.

Conjunctivitis and dacryoadenitis have been reported frequently. Nervous tissue is occasionally involved and optic neuritis, ocular muscle palsies, paralysis of accommodation, and nystagmus have been reported. The eyeball itself is only rarely involved. Only 25 cases are to be found in the literature which report a keratitis or uveitis associated with epidemic parotitis. None of these contain a histologic report.

This is a study of the pathology and antibody response in experiments on animals. Some work has already been done by Bolin and his co-workers, who were primarily interested in the immunologic aspects. The studies presented here deal with the ocular lesions in guinea pigs following the inoculation of living and attenuated mumps virus into the anterior chamber, observed clinically

and histologically, and with their serologic response to different mumps antigens.

The Enders strain of mumps virus was obtained from Dr. Werner Henle of the Children's Hospital of Philadelphia. The virus was inoculated into the allantoic cavity of the developing chick embryo and harvested after five days. Both, the allantoic fluid containing the virus, and the chorioallantoic membranes, containing another antigen, called the Kem Soluble antigen, were used for inoculation. As controls we used: normal, noninfected allantoic fluid, and also allantoic fluid containing the virus but killed by heat or inactivated by exposure to ultraviolet light. A total of 170 guinea pigs were used for the experiments. The virus was inoculated into the anterior chamber with a 27-gauge hypodermic needle, care being taken to avoid injury to the lens. The amount used was 0.03 cc. Two things happen when active mumps virus is injected into the anterior chamber of the guinea pig. There are definite and clearly visible clinical changes, which are essentially a mild iridocyclitis and a severe keratitis and there develops a rise in antibody titers.

Twenty-four hours after injection one sees a conjunctival chemosis, a mild generalized conjunctivitis, a distinct dilatation of the perilimbic vessels which form a ring around the limbus and invade the cornea in a concentric fashion for about one mm. The cornea becomes moderately hazy with the exception of a clear zone near the limbus. The pupil becomes miotic.

With the slitlamp one observes a thickening of the cornea. The epithelium and Bowman's membrane are normal. The anterior one third of the stroma shows many fine white punctate infiltrates. Descemet's membrane near the limbus appears normal. The iris markings are slightly indistinct and many cells are seen in the anterior chamber.

In 24 hours we note: chemosis, dilated perilimbic ring, invasion of cornea, haze of cornea, mild miosis, clear zone at limbus.

Forty-eight hours after inoculation the chemosis and conjunctival injection are increased, the perilimbic ring is denser, the clouding of the cornea is more intense. An anterior uveitis is present. The histologic picture after 24 hours shows corneal infiltrates and fibrinous exudate in anterior chamber, and in 48 hours, severe exudative iridocyclitis.

Seventy-two hours after inoculation of mumps virus into the anterior chamber the conjunctivitis and perilimbic injection began to decrease. The cornea began to clear and the iridocyclitis was also subsiding.

On the fourth day the perilimbic vessels were only slightly dilated and the cornea showed only a faint haze.

On the fifth day the eyes were normal.

An eye enucleated on the sixth day appeared normal. Four days prior to enucleation it showed parenchymatous keratitis and exudative iridocyclitis.

The clinical course varied in some of the animals. This may be due to the variability in amount of virus injected or to a variability in titer or to the response of the individual animal.

The pathologic changes could only be produced when undiluted active virus was injected into the anterior chamber. Neither subconjunctival injection nor corneal scarification would produce them. No lesions were seen when heat-killed virus was used, or virus irradiated with ultraviolet light, or when normal allantoic fluid was used. No response of any kind was obtained with experiments on rabbits.

The animals were bled before inoculation of mumps virus into the anterior chamber and at various intervals thereafter. The sera were titrated for the presence of complement-fixing antibodies by standard methods. High antibody titers were found against both the virus and the soluble antigen contained in the chorioallantoic membranes. The titers were highest after two weeks.

The results of mumps skin tests in two groups of animals showed:

The first group was skin tested four weeks after inoculation and the second group 11 weeks after inoculation of mumps virus by

various routes. Animals with low titers after mumps inoculation (for example, corneal scarification) showed high titers after the secondary antigenic stimulus of the skin test.

The eyes of several animals were enucleated from one to four days after inoculation. The eyes were ground up, suspended in broth containing streptomycin and penicillin and then inoculated into eggs. The virus content was determined as the infective dose for 50 percent of the eggs, called ID-50. The virus content of the eyes drops steeply after injection and no multiplication of the virus takes place in the eye. That finding corresponds to the clinical picture which showed the healing of all lesions on the fifth day.

The studies showed the clinical and histopathologic changes in the guinea-pig eye following the injection of active mumps virus into the anterior chamber. They showed that a keratitis and iridocyclitis develop which reach a maximum after 72 hours and subside completely on the fifth day. The animal responds to the infection by the formation of complement-fixing antibodies which show the highest titers after two weeks.

The two dozen cases of mumps keratitis and uveitis described in man show a comparable picture, with many variations and much longer duration.

Discussion. Dr. Werner Henle: As a virologist, I will stay clear of the ophthalmologic problems and confine my remarks to the virus part. Virus infections of the eye are still a relatively uncharted field, at least from the virologist's point of view. The paper presented by the Kirbers forms an excellent example of what can be done if two specialists, the ophthalmologist and the virologist, get together and work out problems.

This paper has brought into focus several interesting points and problems, which have been considered for sometime in relation to mumps, as well as to other virus infections. One of the problems concerns the pathogenesis of mumps.

We have been talking in the past rather readily of "complications" of mumps, such as meningo-encephalitis, orchitis, and also certain ocular lesions. Actually we know now that the so-called complications very frequently are part of the primary picture, if not on occasion the only sign of infection with mumps virus. That certainly has been proven for meningo-encephalitis and, to some extent, also for orchitis, since in such cases mumps virus has been isolated from the spinal fluid and testicular aspirations, respectively.

More convincingly it has been demonstrated experimentally by Coons and his coworkers at Harvard who, by means of labelled antibodies, traced the spread of the virus after infection of monkeys. They found that the virus was seeded in three to four days throughout the animal, long before the development of clinical signs of disease. Not only was it found in the salivary glands, but also in the meninges and the central nervous system.

So we feel that mumps virus is seeded very early and it becomes a matter of chance or some unknown stimulus, which determines in which organ (s) lesions will develop. It is obvious that mumps meningo-encephalitis in the absence of salivary gland involvement presents a condition which can be diagnosed properly only by applying specific serologic tests. This suggests that in cases of iritis or iridocyclitis, mumps virus may be involved, even if there is no accompanying parotitis, and appropriate serologic tests should be performed.

Another point concerns the question of what is going on in the guinea-pig eye. It has been shown that only fully infectious virus produces the lesions. When it is inactivated by heat or ultraviolet light, nothing happens. It has also been shown that only active infectious virus injected intraocularly will bring forth a significant antibody response comparable to that seen in human infections. If inactivated virus is injected, there is little or no antibody response. Thus, the antibody response cannot just be due to the antigen injected. The results would seem

to indicate that there is some increase in antigen (virus), and with it a greater antibody response. At least this is the way I would interpret the data.

On the other hand, a search for active virus in the eye showed rather a decrease from the time of injection over the experimental period. There was no definite evidence then that the virus had multiplied. However, I think this may be due to the fact that the infectivity titrations are not very sensitive, particularly in view of the relatively large amounts of virus initially injected into the eye. A slight increase in virus might not be detectable with the technique available.

There are, however, other possibilities to explain these observations.

It might be that the cells available to the virus in the eye are incapable of supporting a full cycle of propagation; that is, the cells might not be able to produce fully infectious virus, and only an incomplete cycle of propagation may occur—some virus material is produced but it never acquires the infectious property and, therefore, it might not be detected.

Now this is not mere speculation, because such phenomena have been observed with other viruses. For instance, if influenza virus is injected into the central nervous system of mice there is no production of infectious virus. We cannot measure an increase in infectious virus, yet we can detect an increase in certain virus properties as determined by laboratory tests, such as complement fixation and hemagglutination.

Apparently an incomplete cycle of propagation takes place and no fully infectious virus is produced. The injection of influenza virus into the central nervous system nevertheless produces lesions which frequently lead to convulsions and death of the animal.

It is possible then that a reaction of this nature occurs in the guinea-pig eye. These are problems which certainly would deserve further consideration and study.

M. Luther Kauffman,
Clerk.

MEMPHIS EYE, EAR, NOSE AND THROAT SOCIETY

Perforation of eyeball by fishhook

Dr. J. Wesley McKinney reported the case of J. B. T., aged 24 years, who was first seen on September 16, 1952.

He had been hit in the left eye by a fishing partner as he cast an artificial bait. The fishhook which had passed through the upper lid and into the eyeball had been cut off at the point of curvature by his local physician. The sclera was perforated at the 7-o'clock position at a point three mm. from the limbus. The point and barb of the hook were lying in the anterior chamber, and the iris was retracted under it.

A short keratome incision was made under a conjunctival flap at the 5-o'clock position, and the hook was passed through the new opening by first grasping it at its shank and then at its point as it emerged from the wound.

By the greatest good fortune the lens was not injured, and after two months the vision was corrected to 20/20.

Suprasellar meningioma

Dr. R. O. Rychener reported the case of Mrs. H. L. E., aged 47 years, who had suffered some loss of vision in the right eye for the past year. The left eye was amblyopic from birth. General examination and dental X-ray films in her home town had yielded no information.

Visual acuity was: O.D., 1/60, improved with +6.5D. sph. ⊂ +1.5D. cyl. ax. 30°, to 6/30; O.S., 3/60, improved with +7.0D. sph. ⊂ +2.5D. cyl. ax. 160°, to 6/60. The addition of a +2.0D. sph. gave only J14 in each eye. The pupillary reactions were normal. The right eye disclosed a primary optic atrophy with mild perivascular sheathing over the disc. The left disc was normal in color and appearance save for similar mild perivascular sheathing. The maculas were normal. She had been unable to read for two years and had stopped driving her car for the past year.

The right visual field showed a complete temporal and inferior nasal loss and no color perception. The left visual field was normal for form and color.

Because of the chiasmal character of the right visual field and the absence of headaches, a diagnosis of suprasellar meningioma compressing the right optic nerve was made and cranial exploration advised.

On December 13, 1949, this diagnosis was confirmed by Dr. R. E. Semmes who found a meningioma growing from the dorsum sella and laterally beneath the right optic nerve and pushing laterally. It also grew up beneath the chiasm and an isthmus of the tumor had grown into the optic foramen on both sides. It was possible to remove the tumor completely, as far as could be seen, and the base of the skull was treated with low coagulation current.

The prognosis is always guarded in meningioma arising from this position. Her recovery was uneventful and she left the hospital on December 21, 1949.

She has been seen at intervals since that date and on her last visit to the office, March 3, 1954, her vision in the right eye was recorded as nil and there was complete primary optic atrophy. The left eye had a visual acuity of 6/60 and J10, unimproved with glasses. The fundus was normal except for temporal pallor of the disc. The visual field was excellent.

Accommodation Impairment

Dr. Alice R. Deutsch reported the case of Mr. G. B. F., aged 35 years, who was seen for the first time in July, 1953. He gave the history of being unable to read. He also complained of impairment of his distant vision. He had been fitted with glasses several times during the last few years but could not use the lenses for his work as checker in a grocery store. He had always been in good health except for a virus infection in 1950. He believes that his vision had been satisfactory until this time. He was rejected for service in the Armed forces because of a psychoneurosis.

No abnormalities were visible in the position and motility of either eyeball. The anterior and posterior segments were normal and the pupils were round, equal, and reacted promptly to light and convergence. Uncorrected vision equalled 20/50 in each eye and with +1.0D. sph. he saw 20/20+ with each eye. With the correction he only could see J16 and he needed an addition of +5.0D. sph. to read J1 at 20 cm. The pupils were dilated with four-percent homatropine. There was no change in his dynamic and static refraction.

The intraocular pressure was checked several times during the day and before and after the application of homatropine, and varied between 20 and 22 mm. Hg in both eyes. The peripheral and central fields were normal.

He underwent a complete physical examination which included blood chemistry, spinal tests, X-ray studies of the skull and teeth. All tests were negative. Air studies were not made. A prescription for trifocals was given him and he reported by mail that the glasses were satisfactory and that he wore them all day long. He reported again by mail in March, 1954, that his general health was good and as far as he could judge there was no change in his vision.

Although disturbances of accommodation occur as isolated toxic manifestations after viral and bacterial infections, the condition mostly improves and recovery occurs after two to four months; therefore, it seems at least doubtful to refer the cycloplegia in this patient to the virus disease he is supposed to have suffered four years ago. It is also difficult to ascribe a stationary lesion of this kind to circulatory abnormalities, or an expanding process.

Several detailed papers on ocular manifestations of disseminated sclerosis have been published during recent years; however, none of them mentioned impairment of accommodation as occurring in this disease.

Yaskin, Spaeth, and Vernlund reported isolated paralysis of extraocular muscles as an initial symptom in several of their pa-

tients; four of them showed additional symptoms of this disease only after 10 to 14 years.

Lowenstein described changes in the pupillogram in four cases of early disseminated sclerosis in contradistinction to the traditional rareness of pupillary anomalies in this disorder.

Therefore the question arises, if the cycloplegia in this patient might be an early sign of disseminated sclerosis. Another interesting possibility refers to a paper by Fontaine entitled "Les symptoms oculaires de la myasthenie," (Arch. ophtal., 1952). He states that accommodative difficulty deserves a place in the symptomatology of myasthenia and the cycloplegia might get irreversible after prolonged inaction has produced structural changes.

Hemangioma of orbit

Dr. Philip Meriwether Lewis and Dr. R. L. DeSaussure reported a case of orbital hemangioma successfully removed by the transfrontal approach.

Mrs. M. E. S., a white woman, aged 52 years, was first seen in June, 1953, complaining that the right eye had been gradually getting larger for about one year. She noticed that recently the eyelashes of her right eye brushed against the lens of her spectacles. For the past month or two the sight of her right eye seemed blurred. There had been no headaches, no pain, and no double vision.

Examination showed a proptosis of the right eye. With the Hertel exophthalmometer the right eye measured 20 mm. and the left 15 mm. Vision of the right eye was 20/100; of the left, 20/20. There was no limitation of motion and no diplopia in any direction of gaze. No mass could be palpated even with deep palpation.

There was a definite resistance encountered when an attempt was made to push the eyeball straight back into the orbit. There was a moderate congestion of the retinal veins and the disc was elevated about 1.5 diopters. The eye was otherwise normal.

The peripheral fields of the right eye were slightly contracted and the blindspot was almost twice its normal size. X-ray studies of the orbit and optic foramen were normal as was an arteriogram. The basal metabolic rate was minus 11 percent.

It was felt that there was a tumor in the orbit within the cone of muscles probably involving the optic nerve. A transfrontal approach was agreed upon.

On July 1, 1953, an exposure was made by a transfrontal approach. A mass could then be palpated in the posterolateral portion of the orbit. An incision was made anteroposteriorly through the periorbita and the tumor was exposed. It shelled out easily by blunt dissection, mostly digitally. The tumor was almost round and port-wine colored. It measured 23 by 18 mm. in size. Grossly it appeared to be a benign hemangioma and this was confirmed by microscopic examination.

The patient did well postoperatively. For several weeks there was considerable proptosis but it completely disappeared in a little more than one month.

Final examination was made almost four months after operation. Corrected vision was 20/20 and J1. There was one mm. of enophthalmos, no limitation of motion, and no diplopia. The functional result was all that could be hoped for and the appearance, as shown by Kodachrome slides taken before and after surgery, was practically perfect.

Aneurysm of carotid

Dr. Oscar Dahlene, Jr., presented the case of a 35-year-old Negress who was admitted to the neurosurgical service of the John Gaston Hospital on January 6, 1954, with the following complaints. Three weeks before admission she had a sudden right frontal area pain that knocked her down, but she did not lose consciousness, have convulsive seizure, or stiff neck. The pain continued in the right temporal and retrobulbar regions and was moderately severe. There was no nausea or vomiting, and she heard no noise in her head. One week after the onset of the

symptoms, she noticed a gradually progressive ptosis of the right upper eyelid and that she could no longer hold her right eye straight.

Upon admission, there was complete ptosis of the right lid and no motion on the greatest effort. The right eye was turned outward. It could be turned medially but short of midline, on looking to the left, and moved well to the right. There was no vertical motion, up or down. The pupil was dilated and fixed, with no reaction to light, direct or consensual, or accommodation. No bruit could be heard. There was no loss of sensation of face or cornea.

Arteriograms revealed a smooth, rounded, saccular aneurysm of the right carotid artery in its horizontal forward-bending portion, just lateral to the sella turcica, and about 1.0 by 1.5 cm. in diameter. Blood tests were normal, and the cardiovascular system was otherwise normal for her age. This is considered to be a congenital aneurysm of the carotid artery.

On January 11, 1954, the internal carotid was ligated on the right side in the neck. On January 12th, there was noted a slight return of motion, with a slight upward and outward movement most notable.

Daniel F. Fisher,
Secretary.

OPHTHALMOLOGICAL SOCIETY OF MADRID

March, 1954

Early diagnosis of glaucoma

Dr. D. I. Valentin-Gamazo presented a paper on "Some procedures which can be utilized for the early diagnosis of glaucoma."

Spurred on by Professor Bietti, and following up the latter's work, the author studied those cases of preglaucoma in which he obtained a limited response to the provocative tests for glaucoma. These were sufficient to classify the persons as probably glaucomatous. Except in one case (with an ocular tension which varied between 28 and 30 mm. Hg), all the others had a tension not exceeding 25 mm. Hg.

He made his studies in this way:

First, the behavior of the blindspot was observed under lowered oxygen pressure obtained in a low-pressure room or by ophthalmodynamometric pressure on the eyeball slightly higher than the intermediate retinal systolic and diastolic pressure. (Those individuals who showed a positive oculocardiac reflex were excluded.)

Second, the behavior of the blindspot was observed under the provocative tests.

In preglaucoma and in chronic glaucoma (except where the tension has been normalized by an operation or by miotics) there is a characteristic enlargement of the blindspot; whereas, in normal individuals and in those affected by other (nonglaucomatous) disease, there is no change in the blindspot.

The audiometric behavior was studied under the action of (a) provocative tests for glaucoma, (b) anoxia, (c) fatigue of the cochlea, for which test those subjects were selected in whom it had previously been determined there were no alterations in the audiometric curve (excluded were those afflicted with presbyacousis and others).

a. After the provocative tests it was observed that in the preglaucomatous or glaucomatous eyes, there was a fall of five to 10 decibels in the terminal portion of the audiometric curve, in a few tests the fall was in the form of a wedge. The vestibular stimulation showed a diminution of labyrinthic excitability which perhaps showed a variation of tension in the endolymph. There were no audiometric variations observed in the arterial hypertensives, the arteriosclerotics, the presbyacousics (diminished hearing because of age), or in the normal.

b. After anoxia, the following was observed:

In the preglaucomatous who had previously shown a normal audiogram there was a fall for the high-frequency sounds, and

in those who had shown previously an altered audiogram there was a worsening of that alteration. In normal subjects only under high anoxia, equivalent to an altitude of 5,000 meters (about 16,500 feet), was there observed a hypoacousia, which was always less than 10 decibels. In the presbyacousics, on the other hand, the diminution in hearing acuity was similar to that of the glaucomatous. This should therefore be subjected to a more thorough study.

c. The test after cochlear fatigue gave a diminution in auditory acuteness in the preglaucomatous, which varied between 25 and 30 decibels for the high-frequency zone, although they had had an apparently normal audiogram. In normal subjects, however, the diminution in auditory acuteness was regularly less than five to 10 decibels.

Although these tests alone and by themselves are perhaps not sufficient to assure certain diagnosis of glaucoma, they at least are more sensitive than the older methods.

Joseph I. Pascal,
Translator.

CHICAGO OPHTHALMOLOGICAL SOCIETY

GAIL R. SOPER, *President*

December 21, 1953

The clinical meeting was presented by the Departments of Ophthalmology of Hines Veterans Administration Hospital and Presbyterian Hospital, Dr. Karl Scheribel and Dr. Orville Gordon, presiding.

COLOBOMA OF UVEAL TRACT

DR. KREJCA said that this 65-year-old white woman stated that, since birth, she has had a defect in the iris of the right eye. A younger sister had a similar defect. At the age of 20 years, she noticed painless progressive loss of vision in the right eye.

She was first seen at Central Free Dispensary in October, 1947, at which time vision in the right eye was ability to count fingers at one foot; L.E., 20/100, with correction. There were present mature cortical cataracts, and a coloboma of the iris and choroid inferiorly in the right eye. Tension was 31.5 mm. Hg (Schiøtz), R.E.; 19 mm. Hg (Schiøtz) L.E.

Central and peripheral fields could not be taken in the right eye because of poor visual acuity. The left central field revealed only slight enlargement of the blindspot; the peripheral field was within normal limits.

A right extracapsular lens extraction was performed on January 28, 1948, with a full iridectomy at the 11- and 1-o'clock positions and considerable loss of fluid vitreous. Convalescence was uneventful, and vision with aphakic correction was 20/70. Subsequently the tension in the right eye increased to 33 mm. Hg (Schiøtz) and was controlled with miotics.

On October 26, 1949, a left intracapsular lens extraction with a peripheral iridectomy was performed; there was no vitreous loss. The anterior chamber was shallow for two weeks, then became flat but reformed after three days. The tension, which became elevated, was controlled with miotics. Final vision was 20/20 with correction.

It was the original impression that the colobomatous area of the choroid in the right eye bulged forward, due to a congenital cyst, with glial tissue filling the defect above. It was the opinion of Dr. Bertha A. Klien that the disc was normal but obliquely tilted upward. The vessels appeared normal except that the inferior temporal and nasal branches followed the coloboma. A translucent retinal membrane with superficial vessels seemed to course over and extend beyond the colobomatous area; this actually represented atrophic retinal glial tissue. Pigmentary fragments were noted in the lower part of the choroidal coloboma. An aberrant group of myelinated nerve fibers was noticed above the disc. The macula appeared normal.

Gonioscopy of the right eye revealed many

lacelike processes extending from the iris upward, obstructing the view to the trabeculum throughout the entire angle except in the area of the coloboma of the iris, where they seemed to extend from each side of the iris border and bridge the defect. The ciliary body was seen in the area of the coloboma.

Gonioscopy of the left eye revealed a similar picture with synechias. The right eye showed a rather large upper field defect; the central field showed an upper field defect resembling a Bjerrum scotoma. Tension was 23 mm. Hg (Schiøtz) bilaterally.

Discussion. DR. KARL SCHERIBEL remarked that it is rare to find a coloboma involving the optic nerve as such. Usually the disc plays a passive role, the coloboma encroaches upon it and may distort its shape and tilt it as in this case. This type of defect is hereditary and is usually monocular. Other defects were present, such as formation of opaque nerve fibers at the disc, lens opacities, and associated coloboma of the iris with mesodermal rests in the chamber angle.

In looking at the lesion with the slitlamp and the Hruby lens, it is quite easy to see the large mass of excessive proliferation of the inner retinal layers which formed a bulging mass to fill in the entire colobomatous area. The pigment stopped at the margins of the defect.

Dr. Klien made some drawings which show the marked proliferation of the inner retinal layers with their reduplication, so as to produce this type of lesion, and also to show how the retinal cyst may form.

OPTIC ATROPHY

DR. COLEY presented a 79-year-old woman, first seen at the dispensary in April, 1951, complaining of failing vision in the left eye. She had worn glasses since the age of 15 years. A successful right cataract extraction had been done elsewhere in 1947. The right eye was aphakic with a full iridectomy between the 11:30- and 1-o'clock positions. The optic disc showed a deep central cup. The left eye showed an immature senile cataract and the disc showed questionable glaucomatous cupping.

Intraocular pressure was: R.E., 21 mm. Hg; L.E., 24 mm. Hg (Schiøtz). This was the highest reading recorded in 12 subsequent tonometric determinations in the past two and one-half years. Blood pressure was 170/90 mm. Hg.

On April 26, 1951, a successful left intraocular lens extraction was performed with peripheral iridectomy. Subsequent refraction brought the visual acuity to R.E., 0.8 and L.E., 1.0.

Fields on January 11, 1952, showed a 30 degree peripheral field with a four-mm. white test object. Central fields using a two-mm. white target showed contraction of the upper field of each eye.

On April 14, 1952, the patient complained of loss of field in the right eye. Peripheral fields with an eight-mm. white test object showed partial loss of the upper field of each eye, greater in the right than in the left. In November, 1952, the optic discs were pale and atrophic. Gonioscopy showed wide angles in each eye. Water provocative tests were negative.

Recent examination shows the corrected visual acuity to be 0.8−3 and 0.6+1. The intraocular pressure is 14 mm. Hg in each eye. Visual field tests show a slowly progressive loss of upper field in each eye. The discs are pale gray, with peripapillary choroidal atrophy and sclerosis. The retinal vessels show Grade II arteriosclerosis with a 2:5 arteriovenous ratio. Skull X-ray films show a small sella turcica, no changes in the optic foramina, and no observable sclerosis of the basilar vessels.

Discussion. DR. KARL SCHERIBEL said this case, one of optic-nerve disease, is a sharp contrast to the anomaly previously presented. Here is an optic-nerve atrophy with a typical glaucomatous type of excavation, without any elevation of tension in the eyeball. There is considerable doubt as to the etiology of this type of atrophy. Some have believed it to be due to an elevation of pressure of the

eyeball, but at no time has any tension curve been found.

Another idea was that there was a poorly developed lamina cribrosa which was pushed backward. Dr. Harry Gradle thought this type of excavation followed an intraocular toxic neuritis. Regardless of the many ideas on the etiology, it is agreed that the cause is primarily in the optic nerve itself, with recession of the lamina cribrosa by scar tissue pulling from behind the nerve.

Most cases occur in older people, most of whom have arteriosclerosis, and it is quite possible that the impaired nutrition to the optic nerve permits this type of excavation to be formed. The field changes found are not suggestive of any type of glaucoma and, in most instances, the vision remains good.

Two cases of melanoma

Dr. R. F. Penn said that the first patient, a 33-year-old white man, entered Hines Hospital on June 23, 1952, stating that he had had a small growth on the lower lid of the right eye for 10 years. During the past month he had three episodes of conjunctivitis in that eye. The growth was becoming larger.

Examination showed on the right lower lid, just medial to the point of junction of the lateral one-third and medial two-thirds, a two to three-mm. elevated light brown nodule, 5.0 by 3.0 mm. in size, with a dark center. There was slight redness of the lower palpebral conjunctiva. No adenopathy was noted.

Laboratory studies showed negative findings; X-ray films of the skull showed no evidence of metastases.

The tumor of the right lower lid was excised on June 25, 1952, employing the resection described by Reese. The pathology report on the excised tissue disclosed malignant melanoma, whereupon he was transferred to the tumor service and, on July 17, 1952, surgical extirpation of the right lower eyelid, part of the lateral portion of the upper eyelid, with continuity dissection of the lymph-draining tissues and nodes over the right parotid region, combined with right radical neck dissection, was performed. The right spinal accessory had to be sacrificed because of the closely adjacent nodes. No evidence of metastases was found in the excised tissues, and subsequent examinations at two-month intervals have been satisfactory to date.

On April 21, 1953, plastic surgery was performed to correct an ectropion of the right lower eyelid and a small defect of the right upper eyelid. Sliding flaps were used.

The second patient, aged 39 years, entered Hines Hospital on August 4, 1953, following treatment for a large mole just above the margin of the left upper lid which had been present for at least two years. Some pigment was noted in the area of the mole, extending into the left upper puncta. This area was removed. The pathologic report was given as malignant melanoma and, since pigmentation was still present in the skin near the caruncle of the eye, the patient was referred for more radical surgery. There were questionably palpable soft small lymph nodes in the left submaxillary and upper cervical region; also multiple small benign-looking nevi over the thorax, measuring up to 0.3 mm. in diameter, flat and brown in color.

Laboratory tests were negative; no melanin was found in the urine. X rays of chest, skull, and paranasal sinuses were within normal limits.

On August 10, 1953, a left radical neck dissection, with preauricular node dissection and wide excision of the melanoma of the left upper lid, was performed. The defect was repaired by grafts. The postoperative course was uneventful. Paralysis of the temporal and mandibular branch of the facial nerve occurred. Vision was normal and there was no diplopia. The pathologic report stated that melanoma cells were found only in the eyelid.

Richard C. Gamble,
Recording Secretary.

PROGRAM

of the

ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY

Saint Dennis Room—Dennis Hotel—Atlantic City, New Jersey

June 7 through June 9, 1955

Tuesday Afternoon—June 7, 1955

A new interpretation of the fundus reflexes

Arthur J. Bedell, Albany, New York

Evidence will be presented to prove that the so-called "foveal reflex" does not come from the fovea and also prove that both it and the "retinal reflex" come from the posterior surface of the vitreous.

A group of stereoscopic fundus photographs will be demonstrated.

Goniocycloscopy and ophthalmoscopy with the Allen-Thorpe gonioprism

Harvey E. Thorpe, Pittsburgh, Pennsylvania

The Allen-Thorpe gonioprism can readily be used for examination of the lens periphery, including the equator, the perilental space, and portions of the zonula of Zinn in the intact eye. In the iridectomized eye and in the aphakic eye with iridectomy it is possible to examine the corresponding portion of the suspensory ligament of the crystalline, the ciliary body, the peripheral vitreous and retina, and the ora serrata. Some of the observations made by this method will be reported.

The biochemistry of visual excitation

George Wald, Cambridge, Massachusetts

Many of the basic properties of vision are derived from chemical and physical properties of retinal molecules. Chief among these are the light-sensitive pigments of the retina: rhodopsin and porphyropsin in the rods, and iodopsin and cyanopsin in the cones. All these pigments are conjugated proteins, which owe their color and sensitivity to light to carotenoid prosthetic groups derived from the vitamins A.

The spectral sensitivity of rod and cone vision originates in the absorption spectra of these pigments. Their decay in the light and resynthesis in the dark are the basis of visual light and dark adaptation. The vitamins A enter into the formation of all these pigments; therefore, in vitamin-A deficiency they decline in concentration, producing the condition known as night-blindness.

Virtually all the reactions which these systems undergo in the rods and cones have now been carried out in solution. The rhodopsin system can be assembled in solution by mixing four substances. Comparable syntheses have now been accomplished also with the porphyropsin, iodopsin, and cyanopsin systems.

Studies in the photopic-scotopic relationships in the human electroretinogram

Edgar Auerbach and Hermann M. Burian, Iowa City, Iowa

A series of experiments is reported, the goal of which is to isolate electrophysiologically the scotopic and photopic mechanisms of the retinal response.

The experimental conditions consisted, on the one hand, of diffuse white light adaptation and diffuse stroboscopic white test flashes; on the other hand, of focal light adaptation, both white and colored, and monochromatic test lights obtained from a monochromator.

In showing that the so-called b-wave does in fact consist of two superimposed waves, the first of which we ascribe to the photopic mechanism (x-wave), the second to the scotopic mechanism (b-wave), dark-adaptation curves are presented in which the scotopic response is measured during the photopic phase.

In addition, responses at different intensity levels of the light source are compared and it is attempted to co-ordinate the positive double response and the negative double response in one single curve.

In employing monochromatic lights in connection with both white and colored light adaptation, it is furthermore attempted to confirm the point that the so-called b-wave actually consists of a photopic and scotopic component.

Metabolic injuries of the visual cell

Werner K. Noell, Buffalo, New York

Despite their common origin and late differentiation, the cell populations of the retina differ in metabolism and energy requirements. The main difference in metabolic properties is between the cells of the inner layers and the visual cells. This will be demonstrated by a review of the selective effects upon the mature visual cells of three experimental procedures—intravenous iodoacetate, high intensity x-radiation, oxygen poisoning. By direct interference with the metabolism of the visual cell these procedures produce electroretinographic changes as soon as their metabolic effect has surpassed a distinct threshold. The electroretinographic change is always irreversible and associated with subsequent visual cell death when produced by x-radiation. In case of iodoacetate and oxygen poisoning, almost complete recovery occurs unless the metabolic change is maintained by continued exposure

for several hours. Breathing 100-percent O_2 at atmospheric pressure, for instance, the first electroretinographic changes appear in rabbits between 18 and 30 hours of exposure, but cell death necessitates exposure for 30 to 36 hours. Exposure for 48 hours results in the death of more than 70 percent of the whole visual cell population. This extensive retinal damage is generally associated with no more than moderate signs of O_2 poisoning of other organs. X-radiation requires a total dose of 4,000 to 7,000 r to produce a similar extensive effect.

The experimental analysis of these effects by electrophysiologic, histologic, and biochemical methods enables a discussion of (1) the metabolic organization of the visual cell and the interdependence of its main organelles, (2) the relation between b-wave reduction and the size and location of the retinal damage, (3) the mechanisms by which the three procedures impair cell metabolism, and (4) the dose-effect relations for x-radiation and high O_2 concentration.

ELECTRORETINOGRAPHIC CHANGES FOLLOWING THE ADMINISTRATION OF NEOTETRAZOLIUM, DITHIZONE, AND ALLOXAN TO ANIMALS.

Robert J. Davis and G. Peter Arnott,
Iowa City, Iowa

This report is the first of a series of studies currently being carried out on the origin of the electroretinogram and including, in addition to the work reported here, studies on the effect of vitamin-A deprivation, sectioning of the optic nerve, and ligation of the carotid.

Neotetrazolium, dithizone, and alloxan are known to produce specific pathologic changes in the retina. These drugs were administered to a group of rabbits and the resulting changes in latency, duration, and amplitude of the various components of the electroretinogram of the dark-adapted eyes were measured and correlated with the pathologic changes recorded by fundus photography and in histologic sections.

In the light of the results obtained it is discussed: (1) whether there is a relationship between the extent of damage to the retina and its responses as recorded by the electroretinogram; (2) whether a diminution in amplitude appears only after a high percentage of retina is destroyed, regardless of the retinal layer affected; and (3) whether destruction of the internal layers causes more or less change in the electroretinogram than damage to the internal layers. The electroretinogram is a better index of the functioning of the primary receptor cells than of the ganglion cells.

STUDIES ON THE VISUAL TOXICITY OF METHANOL: ADDITIONAL OBSERVATIONS ON METHANOL POISONING IN THE PRIMATE TEST OBJECT

Albert M. Potts, Julius Praglin, Irene Farkas, L. Orbison, Donald Chickering, Cleveland, Ohio

Additional studies have been made on methanol poisoning in the rhesus monkey which was previously demonstrated to correspond precisely to the human in response to methanol. It has been found that in the monkey with lethal doses of methanol where acidosis has been combatted by base, characteristic electroretinographic changes appear which are apparently identical with those produced in the normal animal by intravenous formaldehyde. Furthermore, examinations of the basal ganglia show focal necrosis which corresponds closely to that described in a human epidemic by Orthner. Additional clinical details will be reported.

RETINAL CHANGES FOLLOWING IONIZING RADIATION

P. A. Cibis and D. V. L. Brown,
Saint Louis, Missouri

This paper will concern the various phases of retinal changes produced in the monkey eye by high intensity ionizing radiation: X rays, Co^{60}-gamma rays, fission neutrons, thermal neutrons, and a combination of fission and thermal neutrons.

ASTROGLIA IN THE HUMAN RETINA

J. Reimer Wolter, Ann Arbor, Michigan

This histology of the retina has been investigated by Cajal and Polyak with the Golgi technique. These authors described the morphology of the neurons and of the Müller fibers but not of the other glial elements. Marchesani and Kolmer stated that astroglia is present in the optic nerve but not in the retina, and assumed that the supporting functions were carried out by Müller's fibers.

With the improved silver carbonate technique of del Rio Hortega modified by Scharenberg, it is possible to demonstrate an elaborate system of astroglia which supports the neurons and surrounds the blood vessels in a manner peculiar to the central nervous system. The morphology of the astroglia is adjusted to the requirements of the retina.

With the same technique it is also possible to impregnate pathologic forms of the astroglia in various disorders of the eye.

Extensive microphotographic evidence of normal and pathologic types will be introduced.

Wednesday Afternoon—June 8, 1955

A REVERSIBLE HYDRATION AND CATION SHIFT OF THE CORNEA

John E. Harris, and Loretta T. Nordquist,
Portland, Oregon

The current studies were undertaken to determine whether changes in corneal hydration can be attributed to cation migration. The techniques employed were those which have been previously

developed in this laboratory to study similar problems in the lens. The studies have consisted of measurement of the changes in hydration and cation content at 37°C. of fresh tissue and of previously refrigerated tissue.

It was found that, under suitable conditions, the normal cation content and hydration of the fresh cornea could be maintained reasonably well during incubation at 37°C. During refrigeration at 0°C., an increase in hydration and sodium content of the cornea was noted. These changes were reversed during subsequent incubation at 37°C. The report includes studies of (a) the kinetics of the exchange during refrigeration at 0°C. and subsequent incubation at 37°C., and (b) the relation of cation movement to hydration under certain conditions.

Some biochemical characteristics of acid injury of the cornea; I. Ascorbic acid studies

M. A. Guidry, J. H. Allen, and J. B. Kelly, New Orleans, Louisiana

The effect of mineral acid burns of the cornea on the ascorbic-acid content of this tissue has been investigated. The ascorbic-acid content of the cornea and aqueous humor of the injured eyes was assayed immediately after injury and at 24-hour intervals thereafter for a total period of 168 hours. There is an immediate drop in the concentration of ascorbic acid in the cornea followed by a slow increase in concentration as the eye heals. There is no immediate effect on the concentration of this substance in aqueous humor. After several hours, however, the concentration of ascorbic acid in the aqueous also falls for a period of time. Experiments designed to determine the mechanism of this decrease in aqueous humor ascorbic acid concentration have been performed.

Lens-induced endophthalmitis: III. Experimentally produced bilateral endophthalmitis phacoanaphylactica

Wood Lyda and Stuart W. Lippincott, Seattle, Washington

An experiment has been carried out in an attempt to reproduce in animals the entity known as bilateral endophthalmitis phacoanaphylactica. The experiment tends to indicate that certain systemic states are prerequisites for the production of the picture in animals and presumably in humans.

The experiment deviates from most lens sensitivity studies in that the animals were not initially systemically sensitized to lens antigen. However, the study points out that systemic sensitivity to an adjuvant is necessary if the animal is to show evidence of systemic lens sensitivity to his own lens material set free in the eye.

Such a series of events are necessary if a hypermature or posteriorly incised lens of the fellow eye is to produce a lens sensitivity type of endophthalmitis.

Some conclusions may be drawn as to the applicability of some types of therapy for bilateral endophthalmitis phacoanaphylactica.

Symposium: Recent trends in Diamox research

V. Everett Kinsey, *presiding*

The effect of Diamox upon the composition of the rabbit aqueous humor

Bernard Becker, Saint Louis, Missouri

The partial suppression of aqueous humor formation that is induced by carbonic anhydrase inhibition results in alterations in the concentration of constituents of the posterior and anterior chamber fluids. These changes tend to validate present concepts about aqueous humor secretion and permit additional estimates of the degree of suppression of flow induced by Diamox.

The mechanism of action of Diamox and the formation of aqueous humor

Harry Green and Irving H. Leopold, Philadelphia, Pennsylvania

Studies with adult pigmented normal rabbits have shown that the systemic and local administration of acetazoleamide (Diamox) resulted in the complete inhibition of the carbonic anhydrase activity in both the ciliary body and iris. At the same time there was no appreciable effect either on the intraocular pressure or on the bicarbonate ion concentration in the anterior aqueous humor. Measurable amounts of the drug were detected in the aqueous humor and in the anterior uveal tissue. Intravenous feeding experiments with sodium bicarbonate indicate that the normal excess of bicarbonate ion in aqueous humor over that in the blood plasma is vitiated in the presence of an elevated bicarbonate ion concentration in the blood plasma. Correlative studies with intraocular pressure measurements indicate that the ocular tension of a normal rabbit eye is dependent upon the maintenance of an excess of bicarbonate ion in the aqueous humor and is independent of the carbonic anhydrase activity of the anterior uveal tissue. Furthermore, it is apparent that the elaboration and active transfer of bicarbonate ion in the normal rabbit eye is not mediated by the carbonic anhydrase activity of the ciliary body and iris. A mechanism for the elaboration of bicarbonate in the aqueous humor is proposed.

Carbonic anhydrase activity and the distribution of Diamox in the rabbit eye

E. J. Ballintine, Cleveland, Ohio, and Thomas H. Maren, Stamford, Connecticut

The carbonic anhydrase activity of lens, iris, ciliary processes, and aqueous humor from albino

rabbit eyes was determined. The high level of carbonic anhydrase in the lens was confirmed. The carbonic anhydrase activity of the anterior uvea was concentrated mostly in the ciliary processes.

In another series of animals the concentration of Diamox in ocular tissues was determined after intravenous administration. The Diamox concentration in the ciliary processes was three to 10 times that in lens or iris, and 20 times the concentration in aqueous humor. Diamox completely inhibited the carbonic anhydrase activity of the processes but not of the lens or blood when measured in our in vitro system.

There were no significant differences between the measurements made on eyes which responded to Diamox administration with a fall in the intraocular pressure and those eyes in which the intraocular pressure was unaffected by Diamox.

Thursday Afternoon—June 9, 1955

THE EFFECT OF SYMPATHETIC NERVE STIMULATION ON THE CILIARY MUSCLE

C. E. Melton, Edward W. Purnell, and G. A. Brecher, Cleveland, Ohio

According to indirect evidence, the ciliary muscle is not an exception to the general rule of dual innervation of smooth muscle. It is believed that, in part, distance accommodation is an active process mediated by the sympathetic nervous system. Morgan and Olmstead have shown that sympathetic stimulation causes flattening of the lens. Fleming has postulated that this sympathetic effect is brought about by depletion of blood in the ciliary body, thus increasing tension on the zonular fibers.

In order to determine whether or not the ciliary muscle is activiated directly by sympathetic nerves, experiments were carried out on excised cats' eyes. Enucleation thus ruled out any vascular effects. The eyes were excised with their autonomic nerve supply intact. Stimulating electrodes were placed on the parasympathetic ciliary ganglion and on the sympathetic long ciliary nerves. Contractions of the muscle were recorded through scleral windows myographically and by motion pictures.

Sympathetic stimulation caused a contraction of ciliary muscle fibers. The direction of the contraction was such that it would increase tension on the zonular fibers and thus flatten the lens.

Parasympathetic nerve stimulation caused the muscle to move in the opposite direction to that obtained with sympathetic stimulation.

It is concluded that both divisions of the autonomic nervous system act directly on muscle fibers of the ciliary body.

SPONTANEOUS AND RADIATION-INDUCED IRIS ATROPHY IN MICE

W. H. Benedict, K. W. Christenberry, and A. C. Upton, Oak Ridge, Tennessee

Atrophy of the iris was observed to develop in all aging LAF_1 mice examined (over 1,000). The disease first became detectable with slitlamp during the second year of life as a roughening of the anterior surface of the iris and progressed with time, culminating in severe fenestration and at times nearly complete loss of iris tissue in old age. Both sexes were similarly affected and the atrophy was bilateral. Animals exposed to ionizing radiations exhibited an earlier onset, more rapid progression, and more advanced final degree of atrophy than nonirradiated controls, in proportion to the dose of radiation. The defect of the iris, as viewed with the corneal microscope, resembled essential iris atrophy in man but included involvement of the choroid. The clinical observations have been confirmed and extended by histologic investigation and by study of the vascular pattern of the iris in involved eyes.

THE EFFECT OF BETA IRRADIATION ON OCULAR WOUND HEALING

James E. McDonald, Oak Park, Illinois, and Howard Wilder, Chicago, Illinois

Fistulizing procedures for glaucoma often fail because of excessive scar tissue formation. Because ionizing radiations inhibit wound healing elsewhere in the body, a study of the effects of beta irradiation on ocular wound healing of corneal and limbal incisions was undertaken. Central corneal incisions were made into the anterior chamber of 50 rabbits, one eye of each having been irradiated immediately before with doses of 1,250 to 20,000 rep from the Strontium applicator. The course of these wounds was studied by slitlamp, photography, and histologic sections at periodic intervals up to six months following surgery. A profound gross and microscopic inhibition of wound healing occurred.

Another group of 20 rabbits were similarly treated except that a dose of 5,000 rep was given at varying intervals prior to surgery ranging from three days to three months. Nothing could be seen grossly or histologically to distinguish this group from the animals which had received radiation immediately prior to surgery.

Ten additional rabbits were given standard limbal incisions into the anterior chamber, one eye of each animal having received a dose of 5,000 rep immediately prior to surgery. No gross differences were noted by slitlamp examination between the irradiated and control eye. Histologic studies of this third group are in progress at the present time.

The mechanism for inhibition of ocular wound healing following beta irradiation appears to be in the profound depression of fibroblastic activity, even if the radiation is given as long as three months prior to the corneal incision.

TISSUE CULTURE METHODS USED IN THE ISOLATION OF THE UNKNOWN GROUP OF EYE VIRUSES

Ann Fowle, Anne Cockeram, and H. L. Ormsby, Toronto, Ontario

The techniques being used in an attempt to isolate and cultivate strains of virus important in oph-

thalmology are described. These include tissue culture, the embryonated hens' eggs, and animal inoculation. Some of the tissues grown in culture are mouse-embryo brain, a strain of the HeLa cell, monkey kidney, human cornea, and conjunctiva. One of the egg techniques consists of the implantation of human cornea, and conjunctiva on the chorioallantoic membrane.

Tears, scrapings, and washings have been collected from a number of patients with eye virus infections and the procedures followed in attempts to isolate virus are described.

Tissue culture techniques in the study of herpetic infections of the eye

Frances W. Doane, A. J. Rhodes, and H. L. Ormsby, Toronto, Ontario

Using cultures of rabbit cornea and HeLa cells, herpes-simplex virus was isolated from eye washings of patients with herpetic keratitis. The virus was also isolated from saliva and mouth washings collected from cases of stomatitis. A positive diagnosis, based on the presence of typical intranuclear inclusion bodies, was given within 20 to 40 hours of inoculation. The cytopathogenic effect of herpes-simplex virus on several cultures is discussed. Techniques used in the study are described and the value of tissue culture in the rapid diagnosis of herpetic infections is shown.

Studies of immunity in vaccinia keratitis in rabbits

J. S. Speakman and H. L. Ormsby, Toronto, Ontario

Following the study of corneal immunity to herpes virus by Hall and co-workers in 1953-54, certain aspects of this work have been repeated in rabbits using vaccinia virus as the infective agent.

The roles of tissue and humoral immunity in modifying the reaction following corneal scarification and inoculation have been studied.

Serologic studies have been made following vaccination by various routes.

Observations on the effect of the corticosteroid hormones on clinical and experimental herpetic keratitis

Samuel J. Kimura and Phillips Thygeson, San Francisco, California

Although the corticosteroid hormones have been widely used in the treatment of various types of keratitis, it may be concluded from the data accumulated in this study that so far as herpetic keratitis is concerned, cortisone, though sometimes beneficial, more often exerts a deleterious effect, and that hydrocortisone may percipitate dendritic keratitis in patients with no previous history of herpetic keratitis. Experimental data on this steroid effect will be presented.

The penetration of cortisone and hydrocortisone into the ocular structures

S. Hamashigi and Albert M. Potts, Cleveland, Ohio

With the availability of C^{14} labeled cortisone and hydrocortisone, opportunity has arisen for specific measurement of the penetration of these drugs when applied to the eye. A method has been devised for application in a controlled manner and for separation of cortisone, cortisone acetate, and hydrocortisone from ocular tissues. Measurements to date indicate the more rapid penetration of cortisone acetate and its conversion to the free alcohol in the eye.

Mitotic activity in epithelia of cultured lenses

V. Everett Kinsey, Carl Wachtl, Marquerite Constant, and Enriqueta Cmacho, Detroit, Michigan

Two criteria have been employed to determine the adequacy of several media for the culture of rabbit lenses. They were, first, changes in the concentration of a number of organic and inorganic constituents of the lens before and after culture, and, second, the alteration in metabolic activities of lenses during culture. Generally speaking, lenses cultured for 24 hours in a semisynthetic medium show little discernible change as determined by either of these criteria.

A more sensitive index of the viability of the cultured lens seems to be the number of cells undergoing mitosis in the lens epithelium at any given time. Measurements of mitotic activity of the epithelium of rabbit lenses after culture for five to nine hours in several natural, one semisynthetic, and one synthetic media were determined and compared with that in the epithelium of the contralateral uncultured lens. Natural media consisted of rabbit aqueous humor, beef aqueous humor, or plasma ultrafiltrate. The semisynthetic medium had a composition very similar to that of aqueous humor, and in addition contained one percent rabbit plasma. The synthetic medium was a commercial culture medium used for tissue culture studies. At the time of writing this abstract only lenses cultured in rabbit aqueous humor were observed to maintain a normal number of cells in mitosis.

Ascorbic-dehydroascorbic acid as an oxidation-reduction system in the maintenance of the metabolism of lens cultured in vitro

Bernard Schwartz and P. J. Leinfelder, Iowa City, Iowa

The lens is an extravascular structure and exists in a medium of low oxygen concentration. In-vitro studies indicate that oxygen is necessary for lenticular metabolism and for the maintenance of water and ion contents. Various techniques suggest a hydrogen transport system in the epithelial regions. This seeming paradox of the need for respiratory activity in the presence of a relatively anoxic en-

vironment can be resolved by the postulate that aqueous dehydroascorbic acid acts as an hydrogen acceptor in lenticular hydrogen transport processes (Goldman and Buschke, 1935).

Experimental evidence has not fully supported this thesis. If, however, one postulates an ascorbic-dehydroascorbic acid system acting at an oxidation-reduction potential level under anoxic conditions, then the problem can be investigated anew. The hydrogen transport system of the lens could then be influenced by both the amounts and ratios of these substances.

Isolated bovine lenses were therefore cultured 48 to 96 hours under nitrogen atmospheres in artificial aqueous as previously described. Various mixtures of ascorbic-dehydroascorbic acid were added so that a range of concentrations and oxidation-reduction potentials was obtained. The pH was maintained constant and oxidation-reduction potentials measured. Lens weight, as well as sodium, potassium, glucose, lactic acid, ascorbic, and dehydroascorbic acids of lens and fluid, was determined.

The significance of ascorbic-dehydroascorbic acid as an oxidation-reduction system in the maintenance of lens metabolism under relatively anoxic conditions will be discussed.

ANAEROBIC CARBOHYDRATE METABOLISM OF THE CRYSTALLINE LENS: THE GENERATION OF HIGH ENERGY PHOSPHATE

Harry Green, Carol A. Bocher, Irving H. Leopold, Philadelphia, Pennsylvania

It had previously been demonstrated that cell-free extracts of young rabbit lenses anaerobically metabolized fructose diphosphate to lactic acid, with the generation of stoichiometric amounts of high energy phosphate measured as readily hydrolyzable phosphate (seven-minute P). In continuation of these studies it has been shown that the generation of the labile organic phosphate is associated with the oxidation of triosephosphate in the presence of inorganic phosphate and the transphosphorylation from phosphopyruvate to a suitable phosphate acceptor. The metabolic pathway of the conversion of fructose diphosphate to lactic acid has been elucidated and is adequately described by the classical scheme of Embden and Meyerhof. The details of the metabolic steps involved in this pathway will be discussed.

PROGRAM

of the

SECTION ON OPHTHALMOLOGY

American Medical Association

Tuesday morning—June 7, 1955

CHAIRMAN'S ADDRESS

Erling W. Hansen, Minneapolis, Minnesota

ADDRESS OF INVITED FOREIGN GUEST

J. W. Tudor Thomas, Cardiff, Wales

FUCHS' SYNDROME OF HETEROCHROMIC CYCLITIS: ANALYSIS OF 30 CASES

Samuel J. Kimura, Michael J. Hogan, Phillips Thygeson, San Francisco, California
Discussion to be opened by: Parker Heath, Sullivan, Maine

CIRCULATORY DISTURBANCES OF THE RETINA WITH PARTICULAR REFERENCE TO THERAPEUTIC PROCEDURE

Banks Anderson, Durham, North Carolina
Discussion to be opened by: Arthur J. Bedell, Albany, New York

SOME INSTRUCTIVE MANIFESTATIONS OF CHIASMAL DISEASE. ONE CASE OF PITUITARY ADENOMA, ONE OF OPTOCHIASMIC NEURITIS (ARACHNOIDITIS), AND ONE OF CHIASMAL GLIOMA

John P. Wendland, Minneapolis, Minnesota
Discussion to be opened by: John Woodworth Henderson, Ann Arbor, Michigan

THERAPEUTIC STUDIES IN EXPERIMENTAL CHEMICAL INJURY OF THE CORNEA

Gustav C. Bahn, James H. Allen, New Orleans, Louisiana
Discussion to be opened by: Hedwig S. Kuhn, Hammond, Indiana

THE ETIOLOGY OF RETINOCHOROIDITIS AND UVEITIS

J. V. Cassady, Carl S. Culbertson, James A. Bahler, South Bend, Indiana
Discussion to be opened by: Harry Feldman, Syracuse, New York

GLAUCOMA ASSOCIATED WITH HYPERMATURE CATARACT; PHACOLYTIC GLAUCOMA: A CLINICOPATHOLOGIC STUDY OF 142 CASES

Milton Flocks, Stuart C. Littman, Lorenz E. Zimmerman, San Francisco, California
Discussion to be opened by: S. Rodman Irvine, Beverly Hills, California

EVALUATION OF METACORTANDRALONE AND METACORTANDRACIN IN OCULAR INFLAMMATORY DISEASE

John H. King, Jr., John R. Weimer, Washington, D.C.
Discussion to be opened by: Dan M. Gordon, New York, New York

Wednesday morning, June 8, 1955

THERAPY OF CONGENITAL GLAUCOMA

E. Norris Robertson, Oklahoma City, Oklahoma
Discussion to be opened by: Joseph S. Haas, Chicago, Illinois

REPORT ON 13 EYES WITH CONGENITAL GLAUCOMA TREATED BY GONIOPUNCTURE

George S. Tyner, Edward J. Swets, Denver, Colorado
Discussion to be opened by: Joseph S. Haas, Chicago, Illinois

MECHANICAL CHANGES DURING ACCOMMODATION OBSERVED BY GONIOSCOPY

Hermann M. Burian, Iowa City, Iowa
Discussion to opened by: Arthur Linksz, New York, New York

TREATMENT OF MONOCULAR CATARACTS

Everett L. Goar, Houston, Texas
Discussion to be opened by: John M. McLean, New York, New York

THE OCULAR SIGNIFICANCE OF INTRACRANIAL CALCIUM DEPOSITS

Joseph E. Alfano, Harvey White, Chicago, Illinois
Discussion to be opened by: Frank B. Walsh, Baltimore, Maryland

CONJUNCTIVITIS ASSOCIATED WITH ADENOIDAL-PHARYNGEAL-CONJUNCTIVAL VIRUS DISEASE

Ralph W. Ryan, James F. O'Rourke, Gilbert Iser, Robert J. Huebner, Joseph A. Bell, Robert H. Parrott, Bethesda, Maryland
Discussion to be opened by: Alson E. Braley, Iowa City, Iowa

Thursday morning—June 9, 1955

ADDRESS OF INVITED FOREIGN GUEST

James H. Doggart, London, England

A NEW PTOSIS OPERATION UTILIZING BOTH LEVATOR AND FRONTALIS

Robert A. Schimek, Detroit, Michigan
Discussion to be opened by: R. N. Berke, Hackensack, New Jersey

EXPERIMENTAL STUDIES ON A NEW METHOD OF TEMPORARY SHORTENING OF THE INNER COATS OF THE EYE

Angelos Dellaporta, Buffalo, New York
Discussion to be opened by: Dohrmann K. Pischel, San Francisco, California

CATARACT SURGERY IN MEGALOCORNEA; A CASE REPORT OF TWO EXTRACTIONS AND REVIEW OF CASES SINCE 1931

John W. Smillie, Ann Arbor, Michigan
Discussion to be opened by: Derrick Vail, Chicago, Illinois

ELECTROMYOGRAPHY OF THE EXTRAOCULAR MUSCLES

Goodwin M. Breinin, Joseph Moldaver, New York, New York
Discussion to be opened by: Francis H. Adler, Philadelphia, Pennsylvania

THE TREATMENT OF GLAUCOMA WITH CHRONIC ADMINISTRATION OF DIAMOX

Bernard Becker, St. Louis, Missouri
Discussion to be opened by: Robert R. Trotter, Boston, Massachusetts

DIAMOX IN THE TREATMENT OF FLAT POSTOPERATIVE ANTERIOR CHAMBER FOLLOWING GLAUCOMA SURGERY

Harvey E. Thorpe, Pittsburgh, Pennsylvania
Discussion to be opened by: Paul C. Craig, Reading, Pennsylvania

FLAT ANTERIOR CHAMBERS

John Bellows, Howard Lieberman, Ira Abramson, Chicago, Illinois
Discussion to be opened by: Peter C. Kronfeld, Chicago, Illinois

OPHTHALMIC MINIATURE

On the Second Variety of Incurable Cataract

The second species of incurable cataract appears as a greenish color of the pupil. The eye also has a bleared expression in addition to the green appearance. Be assured that this cataract comes not gradually but suddenly, and from the hour the patient is attacked he loses his eyesight entirely, so that it is among the most serious of them all. It arises from a great frigidity of the brain, accompanied by a rush of tears. It is also a sequel of worry, loss of sleep, excessive pain, fear, injury to the head, fasting, and similar causes.

Benevenutus Grassus of Jerusalem,
De Oculis Eorumque Egritudinibus et Curis,
(Translated by Casey A. Wood, 1929.)

AMERICAN JOURNAL OF OPHTHALMOLOGY

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Change of address notice should be received not later than the 15th of the month prior to the issue for which the change is to go into effect. Both old and new addresses should be given.

Author's proofs should be corrected and returned within forty-eight hours to the *Manuscript Editor, Mrs. Katherine F. Chalkley, Lake Geneva, Wisconsin.* Twenty-five reprints of each article will be supplied to the author without charge. Additional reprints may be obtained from the printer, the George Banta Publishing Company, 450-458 Ahnaip Street, Menasha, Wisconsin, if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

LATIN-AMERICAN OPHTHALMOLOGISTS

Those of us who have had the privilege of attending congresses and interval meetings of the Pan-American Association for Ophthalmology have gained an increasing respect for the quality and caliber of ophthalmology that is practiced by our Latin-American "amigos" and colleagues. This is in spite of language barriers, still a most serious obstacle to the interchange of information and to the understanding of many problems and difficulties encountered in the field of ophthalmology south of our border. It is to our discredit that our friends there have made much more of an effort to learn English than we to learn Spanish or Portuguese. However, in spite of this very real difficulty, progress in mutual understanding is increasing and undoubtedly will do so more and more in the

future. The Pan-American Association has played a key part in making us more aware of each other, and the friendly good will and gracious hospitality that is the aura of our meetings has engendered many close friendships that continue to grow as the years proceed.

The American College of Surgeons has just completed a third inter-American session held in Lima, Peru, January 11th to 14th. The session was successful and happy. Although ophthalmology, as part of the broad field of surgery and the surgical specialties, played a minor role and few ophthalmologists of the United States were present, those who did attend returned home much refreshed by what they had learned and with the cords of friendship with our fellow ophthalmologists more firmly tied than ever.

Furthermore, because of the itinerary of the gathering much more could be learned of the way our Latin-American colleagues do their daily work than can be ascertained at one of our giant and glittering congresses, important as they are. There is more time to spend visiting the libraries, clinics, and hospitals and to see the facilities, such as they are, by which the work is done. Most importantly, the small gatherings and entertainment in the hospitable and friendly atmosphere of the home and club give one a keener insight and appreciation of our "amigos" than can otherwise be obtained.

The impressions thus gained and strengthened by exposure to these surroundings give us much food for thought. Chief among these is the fact, gained at first hand, that these ophthalmologists are terribly hard working, enduring long hours in earning their daily bread. The general standard of living in most of these countries is low in every respect, and, in order to make ends meet, the physician has to work extra hard and long. He is embued with the universal human desire of striving to make his home the center of refuge from the storms of the day, and the home is often a place of great beauty and repose, the fruit of his labor and the greatest reward of his efforts.

The heart of his home is his family and here one sees evidence everywhere of deep love and affection. The size of his family is usually considerably greater than among us, and we leave his place feeling that a large family, beautifully cared for, living in gracious surroundings and in a cultured and affectionate atmosphere of mutual respect for the individual, particularly for the head of the house, is indeed life's richest reward.

To be able to attain this great blessing demands at least twice as much work at low return than those of us in the North American zone have to endure. It is with great sympathy, therefore, that we should approach the evaluation of the scientific spirit and work of our South American confrères. The long hours of grinding work trying to take care of the swarms of patients in the government-run hospitals on a small salary, and later the long hours of work in private office and hospital in an effort to supplement these wages, is obviously most exhausting.

Little energy is left for experimental research and no time remains for careful and often tedious clinical studies. Indeed, it is extraordinary that, in spite of these handicaps, more and more of this work, frequently of high caliber, is being done, deterred as it is by inadequate facilities for experimental and clinical laboratory studies and even for the simplest gathering of bibliographic data. These are things that, for the most part, we take for granted. We usually have them easily and efficiently available to us.

There is, on the other hand, an obvious and increasing effort on the part of our friends there to overcome these checks to scientific progress, restraints imposed by time, masses of people, economics, and habits inherited from the past. The standards of ophthalmic practice, study, and ethics are rising right along. Currents of influence in this direction are becoming more manifest. The desire and will to correct and improve conditions that will better the scientific work

of our specialty are to be met with everywhere, and there is future promise of many good things to come. It is our part to try to understand their problems. Out of our strength we must turn a sympathetic hand and ear to our colleagues and assist them, however we can, in overcoming their difficulties, with the affection and respect they deserve.

Derrick Vail.

CHICAGO CLINICAL CONFERENCE

The feature of the 1955 Chicago Clinical Conference was the Gifford Lecture delivered by Dr. Algernon B. Reese on the "Relationship of hemangioma of the retina to Coats' disease." Dr. Reese integrated a series of clinical and pathologic observations and combined his sensitive clinical judgment with his superb pathologic skill to demonstrate that small miliary aneurysms were a constant feature of a group of conditions previously grouped as Coats' disease.

The remainder of the program, as in the past, was oriented toward the recent trends in ophthalmology. Dr. Kronfeld discussed the recent changes in the concept of tonometry and created considerable interest with his description of Goldmann's applanation tonometer.

Dr. Linksz urged the early prescription of a temporary lens following cataract operation and described the physiologic basis of many of the symptoms that arise in aphakic patients. He urged in another lecture that greater attention be directed toward variation in illumination in various portions of school rooms and plants.

Dr. Scheffler, in describing the pathology of a large series of ocular injuries, urged routine roentgenographic study of all eyes with lacerations.

Dr. Posner described the various diagnostic procedures in glaucoma and indicated preference for the water provocative test in the open-angle type. His technique in various types of glaucoma surgery was explained in detail, in another presentation.

Dr. James H. Allen urged that cortisone and antibiotics be used only when there are definite ophthalmic indications for their use. He described the treatment of acute herpes of the cornea with systemic potassium iodide in large doses and warned against iodine burns on the cornea with too vigorous local application.

Dr. Reese described his many safeguards in the management of the cataract patient. In a discussion of related fields of medicine, anesthetist Sadove warned of the potentiated effects of thorazine on sedation. Sampter discussed the various types of allergy, and Garvin the diagnostic procedures of neurosurgery.

Some 125 ophthalmologists registered for the course together with a large number of residents from the Chicago area. Round-table luncheons at which questions were put to the speakers were again a feature of the meeting.

Frank W. Newell.

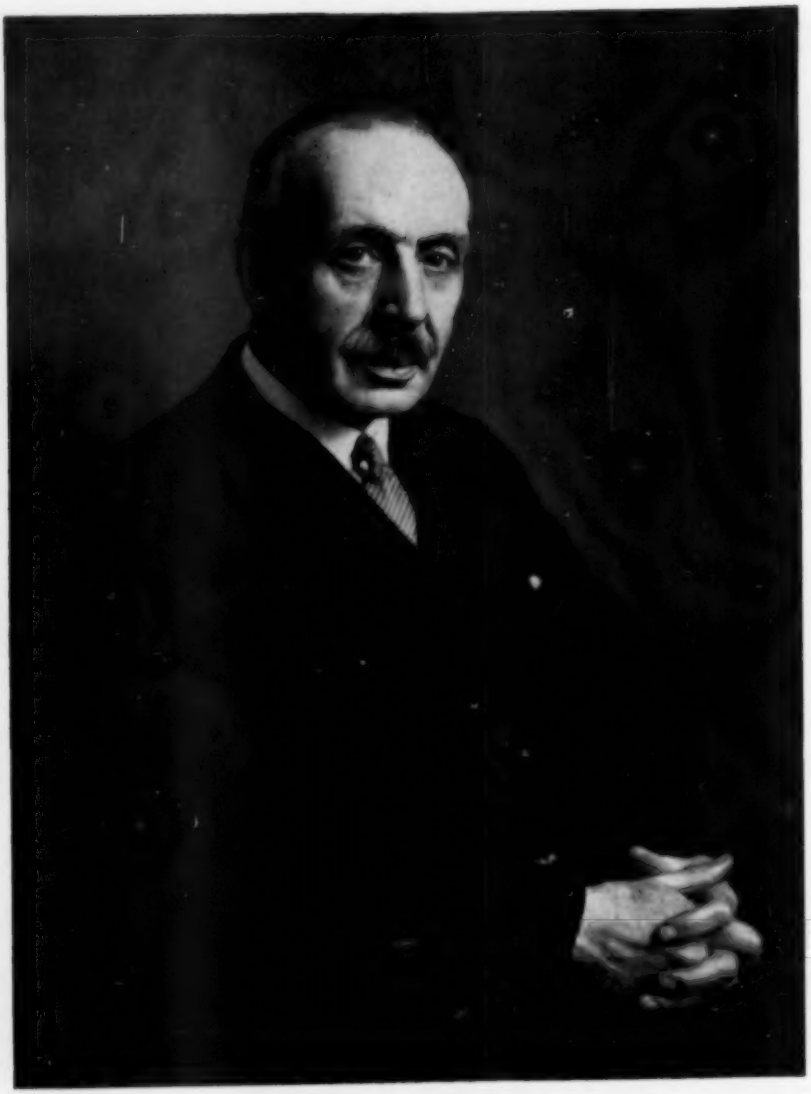
OBITUARY

HARRY MOSS TRAQUAIR (1875-1954)

Dr. Harry Moss Traquair died, in Edinburgh, on Sunday, November 11, 1954, at the age of 79 years.

With his death, ophthalmology loses one of the few who have had the gift and the ability to contribute fundamental additions to our knowledge.

Dr. Traquair was born in Edinburgh in 1875 and was educated at Edinburgh Academy, at the University of Halle, and at the University of Edinburgh. He obtained the degree of M.B. C.M. in 1901, with first-class honors and the diploma in Public Health in the following year, during his initial period of study at the University of Edinburgh. In 1903 he obtained the M.D. degree, and, in



HARRY MOSS TRAQUAIR, M.D.

1904, he was elected a Fellow of the Royal College of Surgeons of Edinburgh.

Dr. Traquair was appointed an ophthalmic surgeon to the Royal Infirmary of Edinburgh in 1927 and a lecturer in diseases of the eye, in the University of Edinburgh, in the same year.

He was elected president of the Royal College of Surgeons of Edinburgh for the period 1939 to 1941, and was president of the Ophthalmological Society of the United Kingdom during the years 1943 and 1944.

He was a member of the council of the Faculty of Ophthalmologists of the Royal

College of Surgeons of England, and, on his retirement, he was elected the first honorary member of the faculty.

Dr. Traquair's interests were wide and, in the broader sphere of medical education, he served as a member of the Senatus Academicus, of the University of Edinburgh, from 1932 to 1941, and was a member of the University Court from 1941 to 1949.

Dr. Traquair's most outstanding contribution to our knowledge was the work which culminated in the publication, in 1927, of *An Introduction to Clinical Perimetry*. The title of his book was perhaps misleading since the volume contained, as Prof. Norman Dott stated in his foreword to the first edition, the author's "rich store of personal observation carefully selected and condensed." The subject of perimetry is, in fact, a branch of ophthalmology with which the name of Traquair will always be associated.

In his later years Dr. Traquair suffered a long period of painful illness which he endured bravely and philosophically. It was indeed a tragedy that medicine should have been deprived of his advice and counsel at a time when it was, perhaps, most needed in the changing times that lie before us.

He will long be remembered as one who gave great and faithful service to medicine and to ophthalmology.

George I. Scott.

CORRESPONDENCE

Dispensing ophthalmologists

Editor,

American Journal of Ophthalmology:

There have recently appeared from various sources rather outspoken criticisms of the dispensing ophthalmologist. One notable instance was an editorial by Dr. S. Rodman Irvine in the March, 1954, issue of The American Journal of Ophthalmology. The criticism, for the most part, is predicated upon an alleged violation of the physicians' code of ethics.

It is perhaps needless to observe that every physician with an awareness of his distinguished heritage will cherish the noble tenets of proper conduct in his profession. However, an excessively introspective interpretation may well tend to devitalize the fundamental strength of such a code and make it a pawn for the esthetic dilettante.

This, I feel, is the impact of the Ivory-Tower philosophers who choose to define a needlessly circumscribed path for the contemporary practitioner of medicine. It would appear that were more effort made to emulate the principal ethical concepts and less to erect specific superficial restraints, the general status of conduct would be infinitely elevated.

The contention of Dr. Irvine that the ophthalmologist who dispenses is more prone to prescribe needless glasses is irrelevant. A physician who is thus easily led to a compromise of principle will more seriously deflect from the ideal of professional conduct at any level and his moral stature will not be refined by any such regulation as Dr. Irvine proposes.

I fail to appreciate how the dispensing of spectacles differs essentially from the commonly accepted practice of dispensing medications by the physician. No prohibition is extant which forbids this practice to the internist, Dr. Irvine's statement notwithstanding. In truth, it would be much more prevalently employed were not the maintenance of the contemporary pharmacopoeia too costly.

There is no doubt but that most patients prefer being able to procure their glasses at the ophthalmologist's office, which precludes further inconvenience and time lost, necessitated by extra trips to the optical company. One could logically speculate that being denied this convenience more patients will readily consider the services of an optometrist.

It is difficult to envisage that the patient is being victimized when glasses are dispensed by the ophthalmologist at prevailing rates or less. At these rates, in most localities, the

cost of glasses is certainly not inordinate as compared with any other commodity involved in medical care. Furthermore, the complete relinquishment of this service to optical companies would under no circumstances effect a savings to the patient.

Dr. Irvine earnestly inquires "How are we going to set the limit as to what is right?," as he concerns himself with the cost of glasses to the patient. The issue is patently without the province of him or the group which he represents. Excessive prices, most certainly, should not be condoned but neither should such self-appointed arbiters who choose imperiously to abrogate the liberties of others or invade the realm of individual freedom of decision.

(Signed) J. E. Imbody, M.D.,
Marion, Ohio.

BOOK REVIEWS

KLINIK DER AUGENSYMPTOME BEI NERVENKRANKHEITEN. Prof. Dr. Werner Kyrieleis. Berlin W. 35, Walter De Gruyter & Co., 1954. 153 pages, 35 illustrations, index. Price: DM 32-

Kyrieleis hopes that not only the ophthalmologist and neurologist but also the general practitioner will profit from his compendium on eye symptoms in nervous disorders. Obviously, he does not expect his book to supplant some of the larger and time-honored texts on neuro-ophthalmology. He rather feels there is a need for a handy reference book to be used in the daily office routine. He avoids controversial subjects as much as possible. There are two main divisions:

The first deals with ocular symptoms in nervous disorders. It is a general discussion of symptoms involving the optic nerve and the visual pathways, abnormalities of pupillary reactions and of the intrinsic muscles, disturbances of ocular motility and, finally, changes involving the seventh and fifth cranial nerves and the autonomous nervous system.

In the second division, Kyrieleis systematically discusses various neurologic entities with special consideration of their characteristic ocular manifestations. There are chapters on the different forms of lues of the central nervous system, on the demyelinating diseases, on epidemic encephalitis and poliomyelitis, on traumatic conditions of the brain including cerebral abscesses, on brain tumors, and on circulatory disturbances. The two final chapters concern themselves with degenerative and hereditary diseases and with functional visual disturbances.

While the material is condensed, of necessity, it is treated much more completely than in the corresponding chapters of textbooks of neurology or ophthalmology of comparable size. Some chapters are outstanding in clarity and detail of presentation, as for instance the ones on epidemic encephalitis and brain abscesses. Curiously enough, the author dwells in great detail on two conditions that are of only limited interest to the physician of today. Unless there should occur another epidemic, it is extremely unlikely that there should be occasion to see cases of epidemic encephalitis. Likewise, there should not be too many survivors of the 1918-1919 epidemic. With our present day treatment, brain abscesses also should be of extremely rare occurrence.

Of great interest, particularly to the general practitioner and surgeon, are the very excellent remarks on disturbances of the pupillary reactions. The author rightly stresses that, in cases of skull injuries, the pupils should not be dilated for fundus study. One should always be able to evaluate at least the appearance of the nerveheads through undilated pupils. The small advantage that can be gained from the use of mydriatics is more than offset by the loss of extremely valuable information to the physician regarding changes in the pupillary reactions.

Certain concepts definitely appear dated. The idea of double representation of the macula due to a partial double crossing of fibers in the corpus callosum probably has

very few supporters nowadays. Kyrieleis considers homonymous quadrant hemianopsia as a chance finding of an incomplete hemianopsia "because there is no anatomic separation between the fibers of the upper and lower visual field quadrants." He does not mention Meyer's loop which affords a perfect anatomic basis for this anomaly. To cite another example, thymoma is not listed as one known cause of myasthenia gravis; yet early recognition of such a tumor and its radiation can be a life-saving procedure.

These few critical remarks should by no means belittle the general usefulness of the book and the purpose for which it is intended The print and general arrangement are excellent. The illustrations are well reproduced and to the point. The very complete index should be quite helpful to the discriminate reader.

Stefan Van Wien.

Peripheral Circulation in Man. Edited by G. E. W. Wolstenholme and J. S. Freeman. Boston, Massachusetts, Little, Brown & Co., 1954. A Ciba Foundation Symposium. 219 pages, 72 illustrations, index. Price: $6.00.

The Ciba Foundation was founded in 1947 as an educational and scientific charity, sponsored by the Ciba chemical and pharmaceutical firm in Basle, Switzerland. There is provided an international center in London, where scientists, working in medical and chemical research, can meet and exchange ideas. Since June, 1949, there have been 24 international symposia; this book is the report of one of these. It covers a subject of great importance to the ophthalmologist, many of whose patients suffer from circulatory disorders.

The papers by workers from North America and Great Britain cover a wide range of subjects, from methods of study, techniques, the effect of drugs and cold, reflexes, vasomotor denervation, ischemia, to functional disorders of the circulation. An attractive and instructive feature is the informal discussion at the end of each paper. The volume is liberally illustrated with charts, diagrams, and excellent photographs. Information is as of now.

Derrick Vail.

Collected Reprints. Francis I. Proctor Foundation for Research in Ophthalmology. University of California. Volume I, 1947-1954.

In addition to the reprints of the first seven (1946-1952) Proctor Lectures that have been given annually at the University of California Medical Center in San Francisco, there are here collected 57 others, making altogether a handsome volume of important contributions to ophthalmology.

The Proctor Lectures that are included are those by Swan, Vail, Cogan, Friedenwald, A. B. Reese, Sir Stewart Duke-Elder, and Rodman Irvine. The papers by the Proctor staff are those of Cordes, Garron, Hogan, Kimura, Spencer, and Thygeson.

Not all of the reprints of the works of all of the members of the Foundation are included. The complete bibliography is indeed a most impressive one and we look forward to the annual appearance of similar reports of the notable work that is being performed at our newest center in the United States for ophthalmic research of which all ophthalmologists in this country are already proud.

Derrick Vail.

Arquitetura do Músculo Ciliar no Homem. By O. Marcondes Calasans. Anais da Faculdade de Medicina da Universidade de São Paulo, **27**:3-98 (June) 1953. (Published by Indústria Gráfica Siqueira s/a Rua Augusta, 235, São Paulo.)

In the first 26 pages of this excellent monograph, the author reviews the literature. In general, previous authors have divided the ciliary muscle into two distinct portions,

longitudinal and circular, some workers adding a third intermediary system consisting of radial fibers.

The author, on the basis of dissections with the aid of the binocular microscope, as well as with histologic studies, concludes that the so-called "ciliary muscle" in man is formed by four systems of oblique smooth muscle bundles, running alternately nasalward and temporalward, and uniting by one extremity in the shape of the letters VV. The most superficial system is inserted posteriorly into the choroid. The remaining three portions are related to the ciliary processes (sclero-ciliary-iridic).

The ciliary muscle increases in length as the fetus advances in age, the larger the diameter of the eyeball the greater the length and the smaller the thickness of the muscle. In myopia and in hypermetropia, the four systems possess a practically identical muscle mass and arrangement.

Charles A. Perera.

PHARMACOLOGY IN MEDICINE. A collaborative textbook. Edited by Victor A. Drill. New York, McGraw-Hill Book Company, 1954. Price: $19.50.

The editor is lecturer in pharmacology, Northwestern University Medical School, formerly professor of pharmacology, Wayne University College of Medicine. There are 82 contributors, all of whom are teachers in major universities and medical schools in the United States and Canada. I haven't counted the pages but there are 87 chapters, comprising 18 parts, and the pages are numbered per part only. The book measures 8½ by 11½ by 2½ inches and weighs six and one-half pounds. There are many figures and diagrams. It is a book that is hard to put in your book shelf, hard to hold in your lap, and, unless you know a lot about pharmacology, hard to read. There is a magnificent index.

The whole world of pharmacology seems to be covered, and if anything in this field is missing, I wouldn't know. It is a book of great value for reference, and the ophthalmologist will find his drugs fully explored, explained, and criticized if necessary. The editor has shown great skill in co-ordinating the work of the individual contributors. It should be at hand for reference by every busy ophthalmologist, if only he can find just where to put it; might I suggest, perhaps, with the phonograph records and the geographic atlases.

Derrick Vail.

BOOKS RECEIVED FOR REVIEW

The following books have been received for review. Acknowledgement is made here because often there is a delay before a suitable review appears.

REACTIONS WITH DRUG THERAPY. By Harry L. Alexander, M.D. Philadelphia, W. B. Saunders Company, 1955. Price: $7.50.

CURRENT THERAPY. By Howard F. Conn, M.D. Philadelphia, W. B. Saunders Company, 1955. Price: $11.00.

NEURO-OPHTHALMOLOGY. By Donald J. Lyle, M.D. Springfield, Illinois, Charles C Thomas, 1954. Price: $17.50.

HYPEROSTOSIS CRANII. By Sherwood Moore, M.D. Springfield, Illinois, 1955. Price: $10.50.

1954-55 YEAR BOOK OF EYE, EAR, NOSE AND THROAT. Edited by Derrick Vail, M.D., and John R. Lindsay, M.D. Chicago, Year Book Publishers, Inc., 1955. Price: $6.00.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

1

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Grignolo, Antonio. **Research on the submicroscopical structure of the lens capsule.** Gior. ital. oftal. 7:300-322, July-Aug., 1954.

The structure of the lens capsule of the ox was studied by different methods; both the ordinary and electron microscopes were used, and the material was subjected to the dark field illumination, polarized light, and the dark phase methods of examination. Transverse sections of the capsule were fixed in Grauman's liquid and stained by the MacManus-Hotchkiss method for polysaccharides. The results of the different examinations were in agreement, and it appeared that the lens capsule is formed of submicroscopic lamallae, held together by a mucoprotein cement substance. This type of structure is similiar to that of the cornea, and is excellent for a transparent tissue. The protein of the lens capsule is very similiar to collagen, if not identical with it. The functional significance of the findings is discussed. (6 figures, 25 references)

V. Tabone.

3

VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Calamandrei, G., Nataf, R., and Besneinov, R. **A rare case of intolerance to the local application of cortisone.** Gior. ital. oftal. 7:371-376, July-Aug., 1954.

A case of sclero-choroiditis of doubtful nature was treated successfully by the local application of cortisone, and the other classical methods. When cortisone was again used for a relapse, petechial hemorrhages appeared all over the body. When the use of cortisone was discontinued, the hemorrhages soon disappeared. Cortisone was tried on six other occasions, and every time petechial hemorrhages reappeared a few hours afterwards. (3 references)

V. Tabone.

Forgács, J. **The optico-vegetative reflexes.** Orvosi Hetilap 44:1208-1211, 1954.

The spectrogram of the cerebrospinal fluid taken after the darkening of the eyes displays quantitative differences from that taken under normal light conditions. The cold pressor test employed in the examination of the effect of light or dark

on the general vascular tonus showed, in the course of the first examination, some deviation after the intravenous injection of 5 cc. of a 4-percent novocain solution, a fact pointing to the role of higher nerve centers in the cold pressor test. In normal individuals, the blood pressure increase produced by cold has, under the effect of darkening, been reduced in 52 percent and augmented in 16 percent of the subjects examined. In glaucomatous persons, it was reduced in 22 percent and augmented in 44 percent, that is, a paradoxic reaction occurred in a considerable percentage of cases. A similar paradoxic reaction was observed with the skin temperature of the one hand when the other hand had been put into cold water: instead of the drop of temperature to be expected and found under normal conditions, elevation of the temperature took place. Gyula Lugossy.

Gemolotto, Guglielmo. **Electrophoretic examination of the protein level of the serum in some ocular affections. I. Retinitis pigmentosa.** Ann. di ottal. **80**:471-476, Oct., 1954.

In 12 patients with pigment degeneration of the retina, electrophoretic analysis of the blood serum demonstrated an increased gamma-globulin percentage. (45 references) John J. Stern.

Guzzinati, G. C. **Relations between the labyrinth and the angioscotoma of Evans, the artificial scotoma of Goldman, and the retinal arterial pressure.** Ann. di ottal. **80**:357-364, 1954.

During vestibular stimulation, the author found variable changes of the retinal arterial pressure; however, in 20 experimental subjects he regularly noted a widening of the Goldman scotoma and the angioscotomas. This confirms the existence of relations between retina and labyrinth although the mechanism of these connections could not be clarified. (20 references) John J. Stern.

Pommer, H. **The effect of local iodine on the eye.** Klin. Monatsbl. f. Augenh. **125**:720-727, 1954.

Then penetration of iodine (100 mg. sodium iodide in 1000 cc. saline solution labeled with I^{131}) through the rabbit's cornea was studied. The concentration in the anterior chamber was higher when a bath was used instead of drops. When the solutions were not at body temperatures, the rate of penetration was increased. (2 figures, 2 tables, 14 references) Frederick C. Blodi.

Rosati, P., and Menna, F. **The action of vitamin B12, vitamin H1, theopterine and cortisone, alone and in combination, on experimental corneal wounds.** Ann. di ottal. **80**:367-392, 1954.

Experimental corneal incisions made with a Graefe knife were treated with the substances mentioned in the title and the eyes examined histologically after two to eight days. Healing was favorably influenced by cortisone associated with vitamin B12 or H1. The latter combination was more acceptable because of the more linear aspect of the resulting scar. Theropterine induces a rapid appearance of scar tissue but the wounds take on a less smooth aspect than those treated with vitamin H1 and cortisone. (2 figures, 44 references) John J. Stern.

Santoni, A. **Researches on the presence of protein in subretinal fluid.** Gior. ital. oftal. **7**: 289-299, July-Aug., 1954.

Examination by electrophoresis of subretinal fluid of eight patients with retinal detachment revealed that in most cases of recent origin there was little albumen. In those cases in which the fluid was rich in proteins, its constitution resembled that of blood serum. Some interesting deductions are drawn from the findings, and

the view is expressed that the pigment epithelium and the other strata of the retina do not appreciably contribute to the formation of subretinal fluid. (6 figures, 8 graphs, 15 references)

V. Tabone.

Schoch, D., and Puntenney, I. **Ionizing radiation cataracts.** Northwestern Univ. Med. Sch. Quart. Bull. **28**:359-363, 1954.

In these experimental studies on the eyes of rabbits, it was found that the ciliary body plays a minor role in the production of radiation cataract. The permeability of the vessels of the ciliary body is altered, but this disappears after five weeks. The periphery of the lens is susceptible to irradiation and the amount of cataract is in direct proportion to the energy content of the radiation absorbed. (2 tables, 23 references)

Irwin E. Gaynon.

Thuránszky, K. **Direct microscopic observation of the effect of adrenalin and acetylcholin on the circulation in the retinal vessels of cats.** Szemészet **4**:150-158, 1954.

The retinal vessels of anesthetized cats can, after the removal of the lens, be observed and photographed with the aid of the epicondensor microscope. After the ligature of both carotid arteries the circulation in the retinal vessels becomes visible. Small doses of adrenalin result in the reduction of circulation in the retinal vessels, although the general blood pressure increases and no change in the caliber of the vessels takes place. After medium doses the speed of circulation first decreases, then it becomes greater. High doses immediately result in the acceleration of the current and passive diliation of the vessels. In hypotonia, and post mortem, adrenalin has a vasoconstrictor effect which is, however, so weak as not to become manifest with normal blood pressure. In eyes with normal circulation the effect of intravenous adrenalin is less marked. Small intravenous doses of acetylcholin have no marked effect on eyes with normal blood supply. Higher doses result in the conversion of circulation: the blood flows in the arteries from the periphery toward the papilla, as long as the decrease of blood pressure due to the acetylcholin lasts.

These experimental data suggest that there is a regulating mechanism outside of the eye, in order to assure, within certain physiologic limits, the even blood supply of the eye despite the changes of blood pressure. In the retinal circulation of normal cats' eyes, adrenalin and acetylcholin do not cause perceivable changes, unless the doses administered lead to blood pressure fluctuations exceeding considerably the physiologic ones.

Gyula Lugossy.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Boles-Carenini, B. **The behavior of the color sense with relation to age.** Ann. di ottal. **80**:451-458, Oct., 1954.

In 170 normal subjects between the ages of 20 and 80 years, Nagel's anomaloscope was used to test the color sense. Statistical analysis shows that between the ages of 20 and 30 years the values of Rayleigh's equation are closer to the mean of normal distribution; that age does not influence Rayleigh's equation up to 60 years of age but there is a significant decrease in the perception of green beginning with the sixth decade. This phenomenon may be explained by the senile sclerosis of the lens and, perhaps, by an increased density of the yellow macular pigment. (1 figure, 2 tables, 15 references) John J. Stern.

Erlanger, J. **Observations on contact lens practice.** Am. J. Optometry **32**:41-44, Jan., 1955.

This is a clinical discussion on the use

of contact lenses in keratoconus. In one case the cornea seemed to change repeatedly to conform to the slope of the contact lens. Paul W. Miles.

Malin, A. H. **Testing aniseikonia with a simplified space eikonometer.** Am. J. Optometry **32**:30-39, Jan., 1955.

An inexpensive space eikonometer was built for use with a test set of iseikonic lenses in the office. Results should be equal to those from the manufactured instrument. Procedure and clinical advice based on a series of 63 patients were given in detail. Paul W. Miles.

Miller, E. F. **Investigation of the nature and cause of impaired acuity in amblyopia.** Am. J. Optometry **32**:10-29, Jan., 1955.

Contrary to studies by Wald and Burian, amblyopia ex anopsia is accompanied by impaired foveal light sense. The amblyopic fovea behaves like dark-adapted normal peripheral retina. Blurring of acuity observed is due to a decrease in normal inhibition intraretinal reflexes and increased irradiation of the image. Inhibition in a normal fovea can be reduced by exposures of 10 milliseconds. The contrast thresholds may predict the results of treatment better than acuity tests. Paul W. Miles.

Puntenney, Irving. **The principles of the cross cylinder and its uses in refraction.** Northwestern Univ. Med. Sch. Quart. Bull. **28**:342-346, 1954.

Although Jackson called attention, 65 years ago, to the value of the cross cylinder which was described by Stoker in 1849, hardly more than a dozen papers have appeared in which the author clearly demonstrates the principles which are involved in this very useful method, nor the errors which can be introduced in using it incorrectly. Puntenney does both these things and also points out the great value of the test because of its speed and accuracy. (3 figures, 16 references)

Irwin E. Gaynon.

5

DIAGNOSIS AND THERAPY

Christensen, L., Swan, K. C., and Allen, A. **Histologic demonstration of heat injury to collagen tissues of the eye.** A.M.A. Arch. Ophth. **53**:79-81, Jan., 1955.

The improved histologic method of demonstrating heat injury to collagenous tissue described by Ross and Walker was modified and adapted for study of the changes induced in the globe by diathermy in retinal detachment surgery. Preliminary studies indicate that the method is superior to previously used techniques for study of scleral burns. It is not suitable for routine histologic study of the globe because it causes gross distortion of the tissues. (1 figure, 1 reference) G. S. Tyner.

Failing, Joseph H. **Anesthesia for eye operations in the aged.** California Med. **82**:32-34, Jan., 1955.

General anesthesia is recommended for eye operations in the aged. Barbiturates are not well tolerated by aged patients. Dramamine gives adequate sedation but does not depress and can be used preoperatively. Demerol is also used for preoperative medication. The pyriform fossa and vocal cords are anesthetized to prevent laryngospasm, coughing and straining. After the induction of anesthesia with pentothal, relaxation of the eyelids is aided by the use of muscle relaxants, such as succinylcholine. Nalline and demerol are administered intravenously, which considerably reduces the amount of pentothal needed. Slowing of the respiration can be promptly relieved by an additional dose of nalline. (12 references)

Orwyn H. Ellis.

Folk, Martha Rubin. **Lipoliquid in treat-**

ment of hemorrhagic diabetic retinopathy. A.M.A. Arch. Ophth. **53**:93, Jan., 1955.

This study of 50 patients suggests that Lipoliquid is of very limited value in the treatment of hemorrhagic diabetic retinopathy. G. S. Tyner.

Kestenbaum, A. **Red shadows on the retina.** Klin. Monatsbl. f. Augenh. 125:663-666, 1954.

Small, dense vitreous opacities, not too far in front of the retina, will cast a red shadow on the fundus. The shadow is red because it contains only light reflected from the choroid and the pigment epithelium. The umbral nature of the phenomenon can be appreciated by rotating or tilting the ophthalmoscope. The red shadow should not be confused with a retinal hole or a hemorrhage. (1 figure)

Frederick C. Blodi.

Lugossy, G., and Takats, E. **Experiences with cortisone.** Klin. Monatsbl. f. Augenh. **125**:749-755, 1954.

The local use of cortisone during the last two years in Budapest is briefly reviewed. It was successful in phlyctenular keratoconjunctivitis (10 patients), interstitial keratitis (2 patients), iritis (30 patients) and episcleritis (10 patients). (1 table, 25 references)

Frederick C. Blodi.

Murphy, J. T., Allen, H. F., and Mangiaracine, A. B. **Preparation, sterilization, and preservation of ophthalmic solutions.** A.M.A. Arch. Ophth. **53**:63-78, Jan., 1955.

Chlorobutanol (0.5 percent) is considered the most nearly ideal preservative for ophthalmic solutions. Unbuffered solutions of the principal ophthalmic alkaloids withstand autoclaving under proper conditions. These conditions are described in detail. (2 figures, 15 tables, 25 references) G. S. Tyner.

Pfeiffer, Raymond L. **Roentgenography of congenital lesions of the eye and orbit.** Pennsylvania Acad. Ophth. and Otol. **7**:124-135, 1954.

The diagnoses with the aid of X rays of neurofibromatosis, glioma of the optic nerve, hemangioma, dermoids, toxoplasmosis, retinoblastoma, craniopharyngioma, xanthomatosis, craniostenosis and adrenal sympathicoblastoma are discussed. (5 figures, 1 table, 7 references)

Robert A. Moses.

Sherman, R. S., Jr., and Hogan, M. J. **Radiation therapy in diseases of the eye.** California Med. **80**:83-90, Feb., 1954.

A very detailed and technical paper on radiation therapy in diseases of the eye is presented. The special techniques developed and methods of treating the various lesions of the globe and its adnexa are presented clearly and in detail. (1 figure, 1 chart, 5 tables)

Orwyn H. Ellis.

Vit, Heinz. **Controlled depression of blood pressure before operation.** Klin. Monatsbl. f. Augenh. **125**:756-757, 1954.

In order to decrease the blood pressure before a cataract extraction or a glaucoma operation a ganglion-blocking agent (Pendiomid) is injected. (2 references)

Frederick C. Blodi.

6

OCULAR MOTILITY

Bachstez, E. **Surgical cure of a diplopia after damage to the superior oblique with contracture of the inferior oblique.** Klin. Monatsbl. f. Augenh. **125**:695-700, 1954.

Damage to the superior oblique muscle occurred during an operation for a mucocele of the frontal sinus. One year later a tenotomy of the inferior rectus muscle of the same eye was performed; this was followed, three days later, by a tenotomy of the inferior rectus on the other side.

Frederick C. Blodi.

Hamburger, F. A. **Medical treatment of strabismus.** Klin. Monatsbl. f. Augenh. **125**:700-704, 1954.

Children who are too young for orthoptic treatment or surgery should be given a sedative (Bellergal, Secatropin) to depress the neurovegetative system.

Frederick C. Blodi.

Nemetz, U. R. **Strabismus operation as a complement to pleoptic exercises.** Klin. Monatsbl. f. Augenh. **125**:704-710, 1954.

The operations performed were tenotomy and advancement. The series was divided into two groups. The patients in one group were given orthoptic treatment only after operation, the other patients had orthoptic treatment before and after the operation. The results were consistently better in the second group, even in unilateral strabismus with amblyopia and anomalous retinal correspondence. (4 tables, 5 references)

Frederick C. Blodi.

7

CONJUNCTIVA, CORNEA, SCLERA

Fine, Max. **Late results of penetrating keratoplasty.** A.M.A. Arch. Ophth. **53**:13-37, Jan., 1955.

The visual results of 100 partial penetrating keratoplasties are reviewed. 74 percent of the patients were improved, and 41 percent had a final visual acuity of 20/40 or better. In the majority of cases a square transplant with direct sutures was used. The highest percentage of improvement was made in cases of keratoconus, Groenouw's dystrophy, and disciform keratitis. Poor results were obtained in dense vascularized scars and old chemical burns. (8 figures, 6 tables, 13 references) G. S. Tyner.

Fleischanderl, A. **Treatment of recurrent erosions.** Klin. Monatsbl. f. Augenh. **125**:747-748, 1954.

Abrasion with 20 percent zinc sulfate solution was successful in 22 patients. This treatment is successful even when the use of iodine has failed. 12 references)

Frederick C. Blodi.

Horne, Gordon O. **Topical cortisone in the treatment of syphilitic interstitial keratitis.** Brit. J. Ophth. **38**:669-672, Nov., 1954.

In order to emphasize the great value of topical cortisone in the treatment of syphilitic interstitial keratitis, and to help to establish it as an imperative method of treatment in this condition, a series of twenty cases (26 eyes) so treated has been briefly reported. When adequate dosage of the hormone was used and the cases were well managed, excellent immediate and long-term results were always obtained; in the whole series, judged by the ultimate visual acuity (measured at periods ranging from 6 to 39 months after the start of treatment), the results were much superior to those reported to have been obtained by other methods of treatment. No contraindication to the use of cortisone was revealed. A more detailed report of the cases is to be published. (2 tables, 5 references) Morris Kaplan.

Martínez Barrios, R., Malamud, D., and Alvarez Arbo, J. M. **Ocular pemphigus. Report of a case treated with cortisone and ACTH.** Arch. oftal. Buenos Aires **29**:329-335, June, 1954.

Pemphigus vulgaris is a chronic, systemic disease characterized by successive crops of bullae in cutaneous and mucous membranes, which after rupture or absorption are followed by a cicatricial contraction of the affected areas. The frequent ocular involvement may lead to a more or less accentuated shrinkage of the conjunctiva and to the development of symblepharon and of a dense opacification and vascularization of the cornea.

The case of a 57-year-old women is

described, in whom the condition had been present without intermission for more than two years. Both eyes were severely affected, as were also—although to a lesser degree—the skin of the lids and cheeks and the buccal, palatine, nasal, vulvar and anal mucosas. Vision in both eyes was reduced to the ability to count fingers at 1 m. Systemic administration of penicillin, streptomycin, aureomycin and terramycin was entirely unsuccessful. Large doses of cortisone, given parenterally for two months, produced but a slight improvement, which was confined to the extraocular lesions and could not be maintained by further administration of ACTH. The end-result was complete blindness in the right eye and an almost total visual loss in the left one. (2 figures, 1 reference) A. Urrets-Zavalia, Jr.

Naquin, Howard A. **Peculiar inflammation of external ear associated with conjunctivitis and sclerokeratitis.** A.M.A. Arch. Ophth. **53**:113-114, Jan., 1954.

Two cases of inflammation of the external ear associated with conjunctivitis and sclerokeratitis are reported. Both subsided spontaneously without treatment. (2 figures) G. S. Tyner.

Ostler, H. B., and Braley, A. E. **Conjunctivitis: its etiologic diagnosis and treatment.** Iowa St. M. S. J. **44**:427-436, Sept., 1954.

The subject is covered for the point of view of the general practitioner. After some general statements on treatment, the antibiotics and cortisone are discussed, and their indications enumerated. Blepharitis is briefly classified and described. Conjunctivitis is then completely classified, and each form is rather thoroughly described, with specific notes on therapy. The whole paper is an excellent modern summary on conjunctivitis. (2 tables, 42 references) Harry Horwich.

Pillat, A. **The guttate cornea.** Klin. Monatsbl. f. Augenh. **125**:641-653, 1954.

The typical slitlamp picture of endothelial dystrophy is described. Fluid can break into the corneal stroma either precipitously or slowly and insidiously; when the development is precipitous the vision becomes suddenly poor but improves after two or three weeks, and when it is gradual the epithelial dystrophy of Fuchs develops. Two unusual cases are reported. In one instance a discshaped degeneration of Bowman's membrane was combined with a guttate cornea; in another patient a peripheral zone of endothelial dystrophy was also present. Among the symptoms are poor vision and colored halos which are caused by diffraction and could be confused with the halos of early glaucoma.

In iridocyclitis the folds in Descemet's membrane remain for a longer time and keratic precipitates are more numerous and longer lasting. Tonometry may easily cause epithelial changes in eyes with endothelial dystrophy. In glaucoma the pigmentation of the posterior corneal surface may be especially marked. After extraction of the cataract from an eye with a guttate cornea the folds in Descemet's membrane may persist for a long time, corneal edema and bullous keratopathy may occur and the chamber may fail to become restored for a long time. The corneal infiltrates in epidemic keratoconjunctivitis may coalesce in these eyes. A relationship with the severity of a scleroderma was found in one patient. (2 figures, 13 references) Frederick C. Blodi.

Purtscher, Ernest. **Phytotherapy of chronic conjunctivitis.** Klin. Monatsbl. f. Augenh. **125**:715-719, 1954.

The author believes that extracts of various plants can be of help in chronic irritations of the conjunctiva. Many examples are given. (9 references)

Frederick C. Blodi.

Rieger, H. **An unusual case of juvenile corneal dystrophy.** Klin. Monatsbl. f. Augenh. **125**:653-657, 1954.

A 21-year-old woman had bilateral corneal opacities which were central and progressing. There was superficial vascularization of the periphery of the cornea. (9 references) Frederick C. Blodi.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Autor, H. **Butazolidin in ophthalmology.** Klin. Monatsbl. f. Augenh. **125**:745-747, 1954.

In 24 cases of iritis this treatment was successful; 5 cc. of a 30-percent solution was injected every day or every second day and not more than ten injections were given. Frederick C. Blodi.

Greer, C. H. **Metastatic carcinoma of the iris.** Brit. J. Ophth. **38**:699-701, Nov., 1954.

Of the many cases of metastatic carcinoma of the iris, which have been reported, only six have been verified by histologic study. Greer adds two verified cases. One occurred in a 67-year-old man in whom the primary source was never discovered but who succumbed to generalized metastasis. Histologic preparations revealed a highly malignant adrenocarcinoma of the iris with almost no general inflammation of the eye. The second case occurred in a 76-year-old man and was secondary to a bronchogenic carcinoma. This tumor was also highly malignant and had given rise to general inflammatory changes in the eye. (2 figures, 11 references) Morris Kaplan.

9

GLAUCOMA AND OCULAR TENSION

Andreani, D. **Secondary rise of the intraocular tension produced by D.F.P. in glaucomatous subjects. Observations with regard to the conditions of the irido-corneal angle.** Ann. di ottal. **80**:341-348, 1954.

Fifty-two eyes with congestive and noncongestive glaucoma were examined gonioscopically before the instillation of 0.1 percent Floropryl. In three eyes with congestive glaucoma and a very narrow chamber angle, the tension rose after this medication. Four eyes with noncongestive glaucoma, which also showed a marked narrowing of the angle, failed to show the fall of the tension observed in all other glaucomatous eyes. The author cautions against the use of D.F.P. in narrow-angle glaucoma. (19 references)

John J. Stern.

Mackie, E. G., and Rubinstein, K. **Iridencleisis in congestive glaucoma.** Brit. J. Ophth. **38**:641-652, Nov., 1954.

An adequate explanation for the continued acceptance of the classical iridectomy in the treatment of acute congestive glaucoma has never been offered and the results of this treatment have not been particularly commendable. Iridencleisis is so successful in chronic simple glaucoma that it should be considered in the acute disease as well, and the hesitation of doing this operation on an acutely inflamed eye is soon overcome by the benefits received. In this report 110 consecutive cases of acute congestive glaucoma, in which iridencleisis had been done, are described. In all cases there was congestion which had been present for six hours to eight weeks. The resulting visual acuity and the control of intraocular pressure and of postoperative complications were superior to those obtained after iridectomy. Sympathetic ophthalmia occurred in two cases; blindness resulted in one. (3 figures, 7 tables, 43 references)

Morris Kaplan.

Stepanik, J. **The pathogenesis of diurnal variations in the intraocular pressure.** Klin. Monatsbl. f. Augenh. **125**:737-743, 1954.

The eosinophil count in the circulating blood shows diurnal variations of some magnitude which are probably regulated by the hypothalamus. Eight patients with glaucoma showed a close, inverse relationship between intraocular pressure and eosinophil count. It is possible, therefore, that the intraocular pressure too is regulated by a hypothalamic center. (2 charts, 1 illustration, 19 references).

Frederick C. Blodi.

10

CRYSTALLINE LENS

Alajmo, Arnaldo. **A study of complicated cataract following retinal detachment.** Gior. ital. oftal. 7:323-349, July-Aug., 1954.

A very interesting study was made of the cataract which follows detachment of the retina when no operation is performed or when surgery is unsuccessful. The author believes that this type of cataract is not materially different from other complicated cataracts, and he found that the first sign of change is noticeable at the posterior pole of the lens, just under the capsule. The cause of the cataract is linked with the various changes that take place in an eye which is the seat of an untreated detachment, rather than with the detachment itself or with the retinal hole. In cases of detachment, the lens usually remains clear for about a year, but it seldom remains so for more than three years if the detachment is not successfully treated. The biomicroscopic appearances of the cataracts, their evolution, as well as their relation to uveitic inflammation are also discussed. (2 figures, 28 references)

V. Tabone.

Alberth, B. **Additional extraction of the capsule of the lens.** Szemészet 4:162-166, 1954.

Of 2,063 operations for senile cataract 696 were extracapsular. In 650 of the latter the capsule could be totally removed separately at the same time, whereby the percentage of intracapsular, or the equivalent of intracapsular, operations increased to 97.7 percent. The separate removal of the capsule was accomplished by reflecting the cornea and the application of Blaskovics' capsule forceps. The procedure is perfectly reliable. Complications, such as loss of vitreous and postoperative irritation, are no more frequent than with the intracapsular operation.

Gyula Lugossy.

Donnegan, Justin M. **Simplifying technics and avoiding complications in cataract extraction.** Iowa St. M. J. 44:563-565, Dec., 1954.

The author describes his technique which consists in the main of Van Lint akinesia, keratome incision, post-placed corneal sutures, fornix-based flap in 86 percent of the patients and a limbus-based flap in the others, and extraction of the lens. (2 tables, 3 references)

Irwin E. Gaynon.

11

RETINA AND VITREOUS

Alajmo, Arnaldo. **Physio-pathology of the retinal circulation as deduced from the function of detached retina.** Gior. ital. oftal. 7:360-370, July-Aug., 1954.

After reviewing the blood supply of the retina, and stressing that the inner layers are supplied by the central artery, and the outer layers by the choriocapillaris, the author discusses the biochemical, histologic and functional changes of detached retina. The return of function after successful treatment depends on the extent and duration of the detachment and on the degenerative processes that have taken place in the retina. It is possible for the outer layers of the retina to be kept alive for some time by the branches of the central artery in case of detachment. (14 references)

V. Tabone.

Capalbi, Stefano. **A case of congenital macular cyst.** Gior. ital. oftal. **7**:350-359, July-Aug., 1954.

After a review of the literature a case is described and discussed. In a man who was 59 years of age and in good health, an ovoid cyst in the region of the macula, raised from the surface about 3 diopters, was seen in the left eye. Visual acuity was 6/10, but there was a slight alteration of the color perception. The field of vision was normal for both white and colors. There was no evidence that the lesion was getting bigger, or that it was changing in any way. The author believes that the cyst was of a congenital type, and that it was situated between the retina proper and the pigment epithelium. (3 figures, 9 references) V. Tabone.

Davies, Windsor S. **Idiopathic lipemia retinalis.** A.M.A. Arch. Ophth. **53**:105-108, Jan., 1955.

This is the fourteenth such case reported. Examination of the fundus revealed widened, milky-white arteries and veins. There also were other multiple yellow-tipped cutaneous papules over the lower extremities. The patient was in good health and the fundus picture and blood returned to normal on a diet of 45 gm. of protein, 18 gm. of fat and 210 gm. of carbohydrate. The patient had no visual complaints, but came to his physician because of the skin eruption. (20 references) G. S. Tyner.

Dellaporta, A. **Retinal folds in hypotony.** Klin. Monatsbl. f. Augenh. **125**:672-678, 1954.

A 50-year-old patient had severe hypotony seven years after a blunt injury. There was papilledema and retina folds were visible at the posterior pole. Such folds occur frequently after a glaucoma operation and are probably the result of a retinal edema, especially of the inner layers. (1 figure, 15 references) Frederick C. Blodi.

Fischer, Franz. **Problems of diabetic retinopathy.** Klin. Monatsbl. f. Augenh. **125**:666-672, 1954.

The author discusses the work of Loewenstein and Ballantyne, Friedenwald, and Becker but adds nothing new. (17 references) Frederick C. Blodi.

Frayer, William C. **Elevated lesions of the macular area.** A.M.A. Arch. Ophth. **53**:82-92, Jan., 1955.

This paper deals with the histopathologic findings in 13 eyes which are enucleated with a mistaken diagnosis of malignant melanoma. Seven eyes showed senile disciform degeneration of the macula, three showed organized subretinal hemorrhages, two showed proliferation of the pigment epithelium and connective tissue in the macula, one showed an elevated connective tissue mass in the macula, probably a result of inflammation. Hemorrhagic extravasations adjacent to the lesion, the absence of serous retinal detachment, and the absence of pigment changes over the surface of the lesion are valuable clinical signs favoring a diagnosis of disciform degeneration. (5 figures, 2 tables, 18 references) G. S. Tyner.

Guzzinati, Gian Carlo. **The examination of the visual field with Goldmann's perimeter is atypical cases of Jensen's chorioretinitis.** Ann. di ottal. **80**:459-470, Oct., 1954.

Three patients were examined in whom unilateral chorioretinitic foci of typical aspect and localization, and of characteristic clinical course made the diagnosis of Jensen's chorioretinitis likely. Examination of the fields with Foerster's perimeter and the Bjerrum screen merely revealed a scotoma corresponding to the focus in two

patients and a complete arciform scotoma in the third one. With Goldmann's perimeter a typical sector scotoma was demonstrated. (3 figures, 34 references)

John J. Stern.

Haig, C., and Saltzman, S. L. **Correlation of visual acuity and absolute luminance threshold in retinitis pigmentosa.** A.M.A. Arch. Ophth. **53**:109-112, Jan., 1955.

The author concludes that measurements of the foveal threshold are a more sensitive index of the progress of the disease than are measurements of visual acuity. (2 figures, 1 table, 11 references)

G. S. Tyner.

Henry, Margaret. **Recent advances in retrolental fibroplasia.** California Med. **81**: 272-275, Oct., 1954.

The author lists the stages of retrolental fibroplasia in the active and cicatricial phases and reviews the literature. Reports on the findings of high oxygen concentration as the etiologic factor are presented in detail. High oxygen concentrations appear to be injurious and this is probably the main cause of retrolental fibroplasia. The withdrawal of tiny premature infants from a concentration of oxygen to normal air should be a gradual process. A cooperative clinical study of all premature infants whose weight at birth was less than 1,500 grams is planned. (2 tables, 34 references)

Orwyn H. Ellis.

Liehn, R., and Schlagenhauff, K., **Statistical evaluation of 300 operations for retinal detachment.** Klin. Monatsbl. f. Augenh. **125**:678-695, 1954.

The operations performed at the University Clinic in Graz between 1945 and 1953 are discussed. Nearly one half of the patients were myopic. In nearly 90 percent of the cases a hole or tear was found and in nearly a quarter of all the detachments more than one tear was present. In 53 percent of cases the patients were cured, but in 31 percent more than one operation was necessary. Trauma preceded the detachment in 40 percent of the patients. (14 tables, 37 references)

Frederick C. Blodi.

Parry, H. B. **Degenerations of the dog retina. VI. Central progressive atrophy with pigment epithelial dystrophy.** Brit. J. Ophth. **38**:653-668, Nov., 1954.

The author describes a progressive degeneration of the central portions of the retina with pigment epithelial dystrophy which he observed in 15 dogs of which 10 were examined at autopsy and four by electroretinography. There were no associated defects elsewhere in the body and some of the cases fell into a definite hereditary pattern while some did not. The cause may be an inadequate blood supply through the choroidal vessels. There is no closely similar human disease although the relationship of the disease to human retinitis pigmentosa is considered. (6 figures, 1 table, 34 references)

Morris Kaplan.

12

OPTIC NERVE AND CHIASM

Oribe, M. F., Zimman, J., and Franke, E. **Gliomas of the intraorbital portion of the optic nerve.** Rev. oto-neuro-oftal. **29**: 125-134, Sept.-Oct., 1954.

The authors give a brief summary of the normal histology of the optic nerve and of the pathologic anatomy of the gliomas. They describe the symptoms, of which the most important is exophthalmos, followed by gradual loss of visual acuity, impairment of ocular motility, chemosis, anesthesia of the cornea, papilledema, retinal hemorrhage, thrombosis of the central vein and atrophy of the nerve. The astrocytomas and oligodendrocytomas are less malignant than the immature gliomas, in which the astroblastic or glio-

blastic elements predominate. In differential diagnosis one considers the meningiomas of the optic nerve which appear in older persons and cause a slower loss of visual acuity. The only available treatment is surgical which consists of enucleation alone or combined with neurosurgical exploration when the tumor has extended intracranially. The authors present the clinical histories of three patients and the pathologic study of the tumor. (8 figures, 6 references) Walter Mayer.

Wallner, E. F., and Moorman, L. T. **Hemangioma of the optic disc.** A.M.A. Arch. Ophth. **53**:115-117, Jan., 1955.

This rare tumor occurred in a 26-year-old white woman without ocular complaint. The lesion was elevated about 4 diopters, and resembled a "cluster of grapes or a raspberry." It remained unchanged during a period of observation of 18 months. (1 figure, 1 table, 12 references) G. S. Tyner.

Weisbaum, M. Byron. **Optic atrophy following acute suppurative sinusitis.** Tennessee St. M. A. J. **47**:329-331, Aug., 1954.

A case of secondary optic atrophy after purulent ethmoidal and maxillary sinusitis in a 12-year-old boy is reported. The patient was seen at the clinic repeatedly. During his first stay in the hospital an external ethmoidectomy was done on the left side and a moderate amount of pus was obtained. The vision of the left eye was lost. During a subsequent stay in the hospital an external ethmiodectomy was done on the right side. The swelling disappeared though no pus had been evacuated. The patient recovered and vision was preserved in the remaining eye.

Irwin E. Gaynon.

13

NEURO-OPHTHALMOLOGY

Alajmo, B., and Simonelli, M. **Considerations on the chiasmatic syndrome.** Gior. ital. oftal. **7**:281-288, July-Aug., 1954.

Three cases of typical chiasmatic syndrome, previously diagnosed as glaucoma, are described and discussed; the lesions were adenoma of the pituitary, and posttraumatic chiasmatic arachnoiditis, and the third was not diagnosed. One patient had had a trephining operation, and another an iridencleisis. After an analysis of the symptoms and findings, and after stressing the features common both to glaucoma and chiasmatic lesions, the suggestion is made that the vascular lesions in glaucoma are apt to be localized in the region of the chiasm. (5 figures)

V. Tabone.

Diez, Magin A. **The frequency of Foster-Kennedy syndrome.** Rev. oto-neuro-oftal. **29**:93-107, July-Aug., 1954.

The author gives a very detailed history of the reported case of Foster-Kennedy syndrome with its classical components: headache, homolateral amblyopia, central scotoma, hyposmia, homolateral simple optic atrophy, and psychic disturbances. The author then describes his own findings in 108 patients with frontal tumors of different localization and emphasizes the frequent deviations he found from the typical Foster-Kennedy syndrome. He found the frequency of amblyopias and central homolateral scotomata in these lesions is less than that reported by other authors. He ascribes the lesion of the optic nerve to the compression in the optic foramen, which would explain all the ocular symptoms in cases of frontal tumor. He points out that the ophthalmoscopic and perimetric changes in cases of frontal tumor do not necessarily reveal the side on which the lesion is situated. (2 tables, 27 references) Walter Mayer.

Diez, M. A., and Adrogue, E. **Binasal hemianopsias.** Rev. oto-neuro-oftal. **29**: 135-146, Sept.-Oct., 1954.

The binasal hemianopsias are much less

frequent that the other hemianopsias, and according to Traquair they are not strictly hemianopsias due to a single lesion in the visual pathway, but are rather due to bilateral lesions in the temporal fibers of the retina, the optic nerve, the chiasm, or the optic radiations. The authors briefly summarize the causes in all cases of binasal hemianopsia, that have been reported, and give an exact account of their own 20 cases with tracings of the visual fields. They believe that the binasal hemianopsias can be ascribed to a dilatation of the third ventricle or to compression of the borders of the optic nerves at the point where they enter the chiasm. (20 figures) Walter Mayer.

Lisch, Karl. **Bell's phenomenon.** Klin. Monatsbl. f. Augenh. **125**:710-715, 1954.

The author noticed a bilateral, inverse Bell's phenomenon after a ptosis operation of Friedenwald-Guyton. In this patient the eyeballs rolled downward during attempts to close the lids. This observation suggests that Bell's phenomenon is a reflex movement initiated in the lids. (25 references) Frederick C. Blodi.

Moro, F. **The fundus in subarachnoidal hemorrhages.** Ann. di ottal. **80**:393-428, 1954.

After an extensive review of the literature the author discusses 37 cases of subarachnoid hemorrhage, in 10 of which the patient died. One subject was examined histologically. In 86 percent of the cases fundus changes were observed which consisted essentially of papilledema, retinal and vitreous hemorrhages, and spasm of the retinal arteries. Histologic changes in one case of subarachnoidal hemorrhage due to the rupture of an aneurysm at the angle between the anterior cerebral artery and the anterior communicating artery consisted of marked stasis of the venous circulation of the eyeball and of the optic nerve with congestion of the choroidal network, papilledema, and hemorrhages in the internal retinal layers and the meningeal sheaths of the optic nerve. These lesions are regarded as the outcome of the stasis in the ophthalmic vein, caused by the increased tension in the cavernous sinus.

The fundus picture in subarachnoid hemorrhage was easily identifiable, even in the absence of characteristic elements, when there were no pre-existing retinal lesions. The interpretation of ophthalmoscopic lesions becomes more difficult where similar lesions existed before the onset, as in hypertension. In cases of definite subarachoid hemorrhage without retinal lesions one can assume the presence of a relatively small amount of blood, or else a site of the hemorrhage far removed from the perichiasmatic optic pathways. A fundus examination can give the neurosurgeon valuable information about the cerebral vasospasm. The severity and extent of the retinal lesions may be significant for the assessment of the intracranial lesion, although an absolute correspondence between the two phenomena must be assumed only with reservations in view of the importance of the site of the hemorrhage. (15 figures, 3 tables, 94 references) John J. Stern.

Scheie, H. G., and Alper, M. C. **Treatment of herpes zoster ophthalmicus with cortisone or corticotropin.** A.M.A. Arch. Ophth. **53**:38-44, Jan., 1955.

Systemic corticotropin, cortisone combined with topical atropine and cortisone provide an effective means for rapid reduction of pain and ocular inflammation associated with herpes zoster ophthalmicus. These agents are not curative but probably block the response of tissues to the viral agent. Antibiotics were used to control secondary infection. (2 tables, 10 references) G. S. Tyner.

14

EYEBALL, ORBIT, SINUSES

Ambos, E. **Bone implant.** Klin. Monatsbl. f. Augenh. **125**:744-745, 1954.

After the enucleation one implants a spherical piece of bone which was frozen and comes from a bone bank. With a saw a horizontal and a vertical furrow are made in the anterior surface of the implant. The rectus muscles are sutured over the furrows. This also improves the contact with the prosthesis. In eight cases the results were good. (8 references)

Frederick C. Blodi.

Bruwer, A. J., and Kierland, R. R. **Neurofibromatosis and congenital unilateral pulsating and nonpulsating exophthalmos.** A.M.A. Arch. Ophth. **53**:2-12, Jan., 1955.

In six cases of this disease reported by the authors and in cases recorded in the literature, the roentgenologic and clinical findings were characteristic enough to make the diagnosis almost unmistakable. The X-ray findings are elevation of the sphenoid ridge, enlargement of the middle cranial fossa, elevation and deformity of the anterior clinoid process, and indistinctness or absence of the temporal line of the greater wing of the sphenoid. Although these changes may be associated with chronic subdural hematoma and dural hygroma, the clinical evidence of neurofibromatosis eliminates these diagnoses. Clinical findings are thickening of the upper lid, café au lait spots, and cutaneous tumors. (13 figures, 17 references)

G. S. Tyner.

Igersheimer, Joseph. **Visual changes in progressive exophthalmos.** A.M.A. Arch. Ophth. **53**:94-104, Jan. 1955.

Some patients with progressive thyrotropic exophthalmos have visual loss due to disturbances in the visual pathways. Six such cases are reported. In five of them visual loss was due to central and paracentral scotomas. The loss of vision was much more marked in one eye than the other in each case. The author feels that the most probable site of the disturbance was the orbital portion of the optic nerve. (7 figures, 38 references)

G. S. Tyner.

Irvine, A. R., Jr., **Exophthalmos—from the standpoint of the ophthalmologist.** California Med. **80**:75-77, Feb., 1954.

The primary orbital tumors of infancy and childhood include hemangiomas, gliomas of the optic nerve, dermoid tumors, teratomas and the various benign and malignant tumors of mesenchymal origin are discussed in detail. Orbital tumors that occur in adults are hemangiomas, meningiomas, bony tumors, mixed lacrimal gland tumors, lymphomas and Schwann's sheath tumors. Acute inflammations, vascular and congenital abnormalities, systemic lesions and the disorders of fat metabolism are listed. Thyrotoxic and thyrotropic conditions are classified with indications for treatment. (4 references)

Orwyn H. Ellis.

Lanning, Charles. **Orbital cellulitis in children.** Cl. Proc. Children's Hosp. Washington, D.C. **10**:140-146, July, 1954.

Orbital cellulitis may follow sinusitis, dental infections, cellulitis of face and lids, and constitutional diseases. The findings are proptosis, chemosis, edema and external ophthalmoplegia. The onset and course are violent. Heavy "blunderbus" doses of antibiotics are warranted. Three cases are reported. (5 references)

Irwin E. Gaynon.

15

EYELIDS, LACRIMAL APPARATUS

Braley, A. E. **Lids, lacrimal apparatus, and conjunctiva.** A.M.A. Arch. Ophth. **53**: 119-141, Jan., 1955.

Pertinent essays which appeared in

1953 and 1954 are reviewed. (190 references) G. S. Tyner.

v. Herrenschwand, F. **Epiphora in elderly patients.** Klin. Monatsbl. f. Augenh. **125**:657-662, 1954.

In old patients epiphora is frequently caused by a senile degeneration of the puncta and not by an inflammation or other pathologic process in the sac or the duct. Cortisone ointment applied to the puncta has alleviated the symptoms.

Frederick C. Blodi.

Iliff, Charles E. **Tumors of the lids and conjunctiva.** Pennsylvania Acad. Ophth. and Otol. **7**:136-142, 1954.

The topic is excellently reviewed with notes on differential diagnosis and treatment. Robert A. Moses.

Jacobs, H. Basil. **Strength of the orbicularis oculi.** Brit. J. Ophth. **38**:560-567, Sept., 1954.

The author describes an instrument for measuring the strength of the orbicularis oculi. The instrument consists essentially of a piston and cylinder connected to a pair of specula that are introduced into the palpebral fissure. The specula are forced together by the power of the patient's lids closing, and an air pressure is developed inside the cylinder head to oppose and overcome this. Measurements were made in 206 subjects of all ages. In 99 medical students, an average finding of 120-130 mm. Hg (60-70 g. weight) was obtained with a wide range on either side of the mean. Males were slightly stronger than females, but there was no consistent variation with age nor was there a right- or left-sided preponderance. It is considered that the instrument may prove useful in estimating the effects of drugs on the orbicularis oculi, and in following the course of recovery in cases of such disorders as Bell's palsy. (6 figures, 2 tables, 1 reference) Morris Kaplan.

Latte, B., and Piredda, A. **Involvement of lids and lashes in a diffuse epidermophytosis.** Boll. d'ocul. **33**:761-770, Nov., 1954.

A seven-year-old boy with Trichophyton gypseum asteroides infection showed therapy-resistant blepharitis in both eyes. (2 figures, 21 references)

K. W. Ascher.

Pereira, R. F., Pianzola, L. E., and Gutiérrez, R. **Lymphosarcoma of the lids and orbit.** Arch. oftal. Buenos Aires **29**:227-235, April, 1954.

A malignant neoplasm arising in lymphatic tissue from proliferation of atypical lymphocytes, lymphosarcoma may appear as a localized disturbance or affect successively or simultaneously several lymph node groups, thus exhibiting a systemic character. The condition may originate in sites, such as the lids and the orbit, where no known lymphoid tissue exists.

The case of a 30-year-old man is presented, in which a progressive swelling of both upper lids had been noticed for the last three years. This swelling was less marked on the right than on the left side, where a hard mass could be felt under the skin and some degree of exophthalmos existed. Excision was performed through a common orbitotomy; pathologic examination supported the preoperative diagnosis. No adequate follow-up was possible. 4 (figures, 24 references)

A. Urrets-Zavalia, Jr.

Reeh, Merrill J. **Clinico-pathologic studies of interesting tumors of the lid and conjunctiva.** Tr. Pacific Coast Oto-Ophth. Soc. **34**:83-92, May, 1953.

Adnexal (basal cell) carcinoma of the lids should be given adequate primary treatment whether by surgery or application of X-rays. Very wide excision may be necessary since growths tend to extend freely in the loose tissues of the lid. Sub-

sequent X-ray treatment must be in full doses to be useful.

If an atypical chalazion is encountered, a histologic study is indicated since other conditions simulating chalazion are not uncommon. (9 figures, 4 references)

Robert A. Moses.

Schenk, H. **Emphysema of the lids.** Klin. Monatsbl. f. Augenh. **125**:757-760, 1954.

An emphysema about the eye usually occurs first in the orbit and is caused by a communication of a paranasal sinus with the orbit. In the case of purely palpebral emphysema reported here the mechanism was altogether different. This patient had fractured a rib and developed an extensive emphysema of the skin, which eventually migrated to the face and the lids. (12 references) Frederick C. Blodi.

Vannas, M., and Vannas, S. **The ptosis operation. Experiences and suggestions.** Ophthalmologica **127**:396-413, June, 1954.

The department of ophthalmology of the University of Helsinki reports on its methods of treating ptosis of the upper lid. For slight drooping a tarsectomy is recommended, with inclusion, in the sutures necessary for the closure of the tarsectomy, of most of the cutaneous radiations of the levator aponeurosis. In cases of more severe ptosis a modification of Blaskovics' resection and advancement of the levator is practiced. The initial incision is made through conjunctiva and tarsus close to and parallel to the lid borders. Having thus arrived at the posterior surface of the orbicularis the dissection is carried upward aiming at the anterior surface of the levator aponeurosis. A special lid clamp is helpful during this dissection. The aponeurosis is now freed by cutting its horns and by dissection upward along the anterior and posterior (conjunctival) surfaces. Sutures are not placed until the end of the operation. The authors consider their "inverted Blaskovics" to be considerably easier than the original procedure. For the most severe degrees of ptosis surgical splints of various materials are recommended. (29 figures, 21 references)

Peter C. Kronfeld.

Waldapfel, R., and Saccomanno, G. **Clinico-pathological studies of obstructions of the tear passages.** Tr. Pacific Coast Oto-Ophth. Soc. **34**:289-299, May, 1953.

In this study, use was made of irrigation (if fluid returns through the upper canaliculus, the obstruction is in the lower sac or in the duct), lipiodol injection and X-ray films, and histopathologic investigation. Dacryocystitis frequently involves the neighboring bone and soft tissues. The importance of intranasal inspection is emphasized. In congenital obstructions of the lacrimal passage, the entrance of lipiodol into the lower portion of the duct was never demonstrated. (9 figures, 5 references) Robert A. Moses.

16
TUMORS

Cogan, D. G., and Kuwabara, T. **Metastatic carcinoma to eye from breast.** A.M.A. Arch. Ophth. **52**:240-249, Aug., 1954.

A patient is reported who had a remarkable arrest and partial resolution of a metastatic carcinoma of the choroid with estrogen therapy. Recurrence necessitated enucleation of the eye. As a result of treatment with estrogens plus X-ray castration the patient improved for a period of over two years. The effective estrogen was diethylstilbestrol. (10 figures, 3 references) G. S. Tyner.

Eisenberg, I. J., Terner, I. S., and Leopold, I. H. **Use of P^{32} as an aid in diagnosis of intraocular neoplasms.** A.M.A. Arch. Ophth. **52**:741-750, Nov., 1954.

As a sequel to a work previously reported the authors carried on further studies with P^{32} in 123 cases. They conclude that the P^{32} test is positive for a malignant lesion if in one hour the uptake is 30 percent or more greater than normal, and the 24-hour uptake is greater than the one hour uptake. The test was 95 percent accurate in indicating the presence of a nonmalignant lesion. (7 figures, 1 table, 3 references)

G. S. Tyner.

Snodgrass, M. B., Lenihan, J. M. A., and Primrose, D. A. **Radioactive phosphorus as an aid to the diagnosis of malignant melanoma of the eye.** Brit. J. Ophth. **38**:553-559, Sept., 1954.

Malignant melanomata may present many diagnostic problems and all too often are missed entirely. Several investigators have reported substantial uptake by melanotic tumors of radioactive phosphorus particularly by tumors involving the skin. In this study it was first determined what a normal intake of a normal eye of phosphorus is in four patients. There were variations in the Geiger counter ticks which were considered in the establishment of this normal. Four eyes with rather advanced monocular melanoma (the diagnosis was confirmed by histologic studies after enucleation) were then tested under the same circumstances as the normal eyes. There were no appreciable differences in the uptake by the normal eyes, the fellow eyes and the diseased eyes. It was concluded, therefore, that radioactive phosphorus is of no diagnostic help in malignant melanosarcoma of the eye. (3 figures, 2 tables, 10 references) Morris Kaplan.

17
INJURIES

Dennis, Richard H. **A simple procedure for treatment of alkali burns of the eye.** Main Med. A.J. **45**:32-34, Feb., 1954.

The treatment advocated consists of immediate copious irrigation, hospitalization, removal of all devitalized tissue and alkali under pontocaine anesthesia, irrigation with normal saline solution every 15 to 30 minutes during the first day, neutralization and irrigation with weak acetic acid, antibiotics, and the use of egg membrane to prevent adhesions. (11 references) Irwin E. Gaynon.

Graves, O. M., Jr. **Deep anterior chamber following trauma.** A.M.A. Arch. Ophth. **52**:460, Sept., 1954.

A pathologic deepening of the anterior chamber following trauma to the eye is associated with a posterior laceration of the globe. G. S. Tyner.

Heath, Christopher. **Recovery of sight after rupture of the globe.** Brit. J. Ophth. **38**:567, Sept., 1954.

A 44-year-old one-eyed man was kicked in the eye by a cow and suffered a rupture of the sclera in the ciliary region extending from the 11:30 to the 2:30-o'clock position. The wound was cleaned and tightly closed. Both the anterior and vitreous chambers were filled with clotted blood. The blood was slowly absorbed so that 15 months after the injury vision was 6/6 with a 11.5 D sphere and 3 D cylinder and the fundus was perfectly normal. (1 figure) Morris Kaplan.

Leonardi, Filippo. **The "Berman Metal Locator" for the generic and qualitive diagnosis of intraocular foreign bodies in clinical practice.** Ann. di ottal. **80**:429-450, Oct., 1954.

After a review of previous methods of localization of foreign bodies Berman's locator is described and 82 cases of suspected intraocular foreign body are reported. The author finds that this instrument and radiographic methods complement each other in the diagnosis of the presence, the nature, and the localization

of a foreign body. (6 figures, 1 table, 25 references) John J. Stern.

Rubinstein, Kazimierz. **Intraocular foreign bodies.** Brit. J. Ophth. **38**:369-377, June, 1954.

The author is guided by the surgical principle that all foreign bodies localized in the anterior chamber or lens should be extracted by the anterior route and that those in the vitreous should be extracted by the posterior route. Accurate localizations were not made. The quadrant of the globe was selected according to the localizing X-ray chart with an approach through the pars plana. The region of the ora serrata was invaded only in cases of extreme posterior localization. Diathermy was not used.

The eye apparently either survives this kind of injury and surgery and returns more or less to normal or it is irreparably damaged. There is no appreciable drop in the earning capacity of these patients. Retinal detachment occurred in seven percent of the cases. The original trauma to the retina and organization of the vitreous body causes these detachments. Established vitreous infection is not controlled by antibiotics. A quiet eye with a retained metallic foreign body must be kept under observation but the foreign body can be left in place. Hammering is the most frequent cause (76 percent) of intra-ocular foreign bodies. The factors of fatigue and poor illumination do not seem to influence their frequency. (13 figures, 5 tables, 7 references) Orwyn H. Ellis.

de Saint-Martin, R. **An unusual subpalpebral foreign body.** Ann. d'ocul. **187**:825-827, Sept., 1954.

An eight-year-old boy was brought to the author with a foreign body, resembling a blade of grass, projecting 3 mm. from the surface of the upper palpebral conjunctiva. Great difficulty was experienced in removing it. It was then discovered to be a bristle of wild barley, which had entered the conjunctival sac, and under the influence of movements of the eye and lid had within an hour perforated the conjunctiva and penetrated the orbit to a depth of two centimeters.

John C. Locke.

18

SYSTEMIC DISEASE AND PARASITES

Bernsmeier, A., Sack, H., and Siemons, K. **Hypertension and cerebral blood-flow. (Special consideration of eyeground changes and neurological complications)** Klin. Wchnschr. **32**:971-975, Oct. 15, 1954.

The investigations of these authors gave results which are in accord with the previous findings of several American investigators, namely, that no significantly prognostic correlation exists between the status of the retinal vessels and the possible occurrence of acute cerebrovascular disturbances in the hypertensive subject. (7 tables, 17 references)

William C. Caccamise.

Braley, Alson E. **Ocular findings frequently diagnostic of some general diseases.** Tr. Pacific Coast Oto-Ophth. Soc. **34**:65-81, May, 1953.

Riboflavin deficiency, keratitis sicca, familial autonomic dysfunction, Still's disease, pheochromocytoma, hepatolenticular degeneration, Marie-Strümpell arthritis, Behçet's disease, Boeck's sarcoid, arachnodactyly, tetany cataract, myotonic dystrophy, diabetes, toxoplasmosis and amebiasis are described and discussed. (10 figures, 4 references) Robert A. Moses.

Guzzinati, G. C. **Lacrimal function in diabetics.** Boll. d'ocul. **33**:754-760, Nov., 1954.

The results of Schirmer's tests and the slitlamp appearance of the corneal epithelium after fluorescine instillation in 104 diabetics (32 men and 72 women) and

74 nondiabetics (24 men and 50 women) were compared. From the tables it becomes evident that in diabetics, particularly the older ones, reduced lacrimal secretion, corneal disease and keratoconjunctivitis sicca occurred more frequently than in the nondiabetics. (27 references)

K. W. Ascher.

Hentschel, Franz. **Disturbances in the venous and arterial circulation of the retina.** Klin. Monatsbl. f. Augenh. **125**: 595-604, 1954.

The author offers some generalizations on vascular occlusions in the retina which frequently occur in patients with cardiac disease. Vasodilators are recommended and the advice of an internist should be sought. (16 references)

Frederick C. Blodi.

Kupfer, Carl. **Relationship of hypercementosis to the exophthalmos of hyperthyroidism.** A.M.A. Arch. Ophth. **52**:942-945, Dec., 1954.

Hypercementosis (abnormal thickening of the cementum of the teeth), occurs in about 80 percent of women with thyrotoxicosis whereas in normal women the incidence is 20 percent. It occurs four times as frequently in patients without malignant exophthalmos as in those with malignant exophthalmos. (3 figures, 1 table, 5 references)

G. S. Tyner.

O'Reilly, M. J. J. **Acquired toxoplasmosis. An acute fatal case in a young girl.** M. J. Australia **2**:968-970, Dec. 18, 1954.

Acute fatal toxoplasmosis in a girl aged ten years is described. Inflammatory lesions were present mainly in the myocardium and lung. Organisms morphologically identical with toxoplasma were found in the myocardium, cerebral cortex, lung, liver and lymph glands. The eyes were apparently not examined. Death occurred from myocardial failure.

Ronald Lowe.

Sakai, T. **Studies on the capillary blood pressure in the macular region in pregnancy.** Acta Soc. Ophth. Japan **58**:1580-1598, Nov., 1954.

Sakai measured the capillary blood pressure in the macular region. In normal women, he found an average value of 31 mm. Hg. There was no increase in pressure in pregnancy before the ninth month. In the tenth month, however, the average pressure became 33 mm. Hg. In 25 cases of toxemia of pregnancy without systemic hypertension, the average capillary pressure was 39 mm. Hg and in 31 cases of toxemia with hypertension it was 43 mm. Hg. The author emphasizes the fact that there was often an increase in the capillary pressure at the macula in toxemia, even in the absence of systemic hypertension, and that in such cases a fundus change was observable. In normal pregnancy, slight but similar changes in the capillary pressure and in the fundus could also be observed at the end of gestation. The author further adds the fact that in toxemia with hypertension, a normal tension could be restored soon after the delivery if changes in the fundus were absent. On the contrary, in toxemia without hypertension, a transitional hypertension could result after the delivery, if a change in the fundus was present. (32 tables, 28 references) Yukihiko Mitsui.

Schwab, F., and Sochor, F. **Ocular involvement in temporal arteritis.** Klin. Monatsbl. f. Augenh. **125**:727-736, 1954.

The first two Austrian cases are reported. Both patients were women and over 70 years old. Blindness occurred suddenly. It was unilateral in one patient and bilateral in the other. The ophthalmoscopic picture resembled that of papillitis. Biopsy revealed a granulomatous arteritis. (2 figures, 35 references)

Frederick C. Blodi.

Toulant, P., and Boithias, R. **Lesions**

of the fundus in onchocercosis. Arch. d'opht. **14**:567-583, 1954.

The authors note that eye lesions have been recognized in onchocercosis since 1917 and that they are the most important and disabling lesions of the disease. They note further that many cases of the disease would pass undetected were it not for the ocular lesions. In a previous study in 1952 the authors described the anterior segment lesions, consisting principally of superficial keratitis and iridocyclitis, but in the present report they limit themselves to posterior segment disease, principally chorioretinitis, which is responsible, along with optic atrophy, for most of the blindness due to onchocercosis.

The chorioretinitis is characterized by the multiplicity, diversity, and large size of the lesions. Toulant and Boithias have noted a few cases of tapetoretinal degeneration as described by Ridley. They mention the frequent occurrence of small retinal hemorrhages, most often in the central area. They consider optic atrophy, however, to be the most characteristic lesion and note the occasional occurrence of atrophy in the absence of other ocular abnormality. They then comment in detail on the symptomatology, the pathology, and the diagnosis of the disease which is based on finding the parasites in subcutaneous nodules, or in the aqueous, or in conjunctival biopsy material. They comment also on prophylaxis and on treatment, particularly with the derivatives of peperazine such as hetrazan, which has been effective in ameliorating, if not curing, the disease. (6 figures, 26 references)

P. Thygeson.

Utsumi, Y. **Pulse wave of ophthalmic artery, 2nd report. Transmitting time of the wave in hypertensive patients.** Acta Soc. Ophth. Japan **58**:1265-1270, Oct., 1954.

The author measured the transmitting time of the pulse wave from the heart to the ophthalmic artery in 71 hypertensive patients. The measurement was performed by means of Uemura's apparatus. The time between the Q-spike of the electrocardiogram and the a-point or the beginning of the pulsation in the ophthalmic artery was interpreted as the transmitting time. In normal subjects the Q-a interval was 0.147 seconds on the average. In hypertensive patients of groups I, II, III and IV of the Keith-Wagener classification, the average Q-a interval was 0.143, 0.109, 0.089 and 0.067 seconds respectively. The author concludes that with an advancement of the sclerosis of the vessels, there is a shortening of the transmitting time of the pulse wave in the ophthalmic artery. (6 tables, 15 references)

Yukihiko Mitsui.

19

CONGENITAL DEFORMITIES, HEREDITY

Agarwal, L. P., and Raizada, I. N. **Case notes. Congenital membranous cataract, dentigerous cyst, and multiple fibrolipomata.** Brit. J. Ophth. **38**:383, June, 1954.

A case of congenital membranous cataract, dentigerous cyst, and multiple lipomata is reported. The mother of the patient contracted mumps during the second month of pregnancy. Since the tooth bed is developed in the sixth week of intra-uterine life and it is at this time that the lens is also forming, it seems possible that a common factor was present which adversely influenced the formation of a healthy tooth bed and the development of the lens. (7 references)

Orwyn H. Ellis.

Dunnington, John H. **Congenital alacrima in familial autonomic dysfunction.** A.M.A. Arch. Ophth. **52**:925-931, Dec., 1954.

The disease has been reported only in children of Jewish extraction. Foremost among the associated symptoms are cyclic vomiting and paroxysmal hypertension.

Corneal hypesthesia and defective lacrimation with the usual sequellae are the principal ocular findings. Treatment is palliative and control of corneal ulcers. Three cases are reported. (2 figures, 11 references) G. S. Tyner.

Friede, Reinhard. **Euryopia and ocular hypertelorism.** Arch. f. Ophth. **155**:359-385, 1954.

The author calls the normal distance between the inner canthus of the right and left eye "euryopia." He reports its physiologic variability which he measured in a large number of subjects and adds some comparative and anthropologic studies as well as the clinical description of a few cases with hypertelorism. The average value for adults in Austria showed an euryopia of 30 ± 6 mm. An abnormal increase of the intercanthal distance occurred most commonly in hypertelorism. This condition also shows some or all of the following signs: microphthalmus, microcornea, hyperopia and increased refraction of the corneal surface. The base of the skull and the frontooccipital diameter of the frontal sinus may be shortened, the base of the nose may be deformed, the inferior orbital fissure enlarged and the lacrimal bone may be perforated. Hyperplasia of the jaws and other bones may be found. The hairline of the head may show abnormal demarcation. (29 figures, 13 references)

Ernst Schmerl.

Hopen, Joseph M. **Congenital eversion of the upper eyelids.** A.M.A. Arch. Ophth. **53**:118, Jan., 1955.

A congenital eversion of both upper lids of a newborn infant was alleviated by temporary suturing of the lids. (1 figure, 1 reference) G. S. Tyner.

Newell, F. W., and Koistinen, A. **Lipochondrodystrophy (gargoylism).** A.M.A. Arch. Ophth. **53**:45-62, Jan., 1955.

The complete syndrome includes many anomalies: corneal clouding, mental deficiency, partial deafness, hepatosplenomegaly, cardiac hypertrophy, dwarfism, kyphosis, a variety of skull deformities, coarse skin, thick lips, enlarged tongue and ears. This paper deals with the associated ocular anomalies which are apparently greater in number than is usually appreciated. The anomalies found in these cases were corneal clouding, hyperplasia of the ciliary epithelium, changes in the ganglion cells and inner nuclear layer of the retina, and thickening of the piaarachnoid of the optic nerve. (11 figures, 56 references) G. S. Tyner.

Páez Allende, F. **Heterotopic lacrimal gland in a case of neurofibromatosis.** Arch. oftal. Buenos Aires **29**:199-205, April, 1954.

A seven-year-old boy, who had a widespread form of von Recklinghausen's disease and an abnormal communication of the ventricles of the heart, showed a pinkish, slightly protruding tumor mass in the right eye, which covered the external two-thirds of the cornea, was of a congenital origin and proved to be an aberrant lacrimal gland when excised and examined histologically. (4 figures, 6 references). A. Urrets-Zavalía, Jr.

Parry, H. B. **Degenerations of the dog retina. Generalized progressive atrophy of uncertain etiology.** Brit. J. Ophth. **38**:545-552, Sept., 1954.

A generalized degeneration of the retina and an atropy of the pigment epithelium which is hereditary in nature occurs in the Irish setter. Parry describes this same disease in two litter mates of Afghan hounds and a form which was considered as idiopathic occurring in a yellow Labrador retriever. The first two completely blind hounds were mated with red Irish setters carrying the gene for hereditary generalized progressive retinal

atrophy, but since all the offspring were normal, it was concluded that the responsible gene was different. In these cases the degeneration affects most layers of the retina, but the pigment epithelium is most affected and more so in the periphery of the fundus. There are also severe degenerative changes in the walls of the retinal and choroidal blood vessels. (4 figures, 1 table, 3 references)

Morris Kaplan.

Siliato, Francesco. **Gonioscopy in some congenital anomalies of the eyeball (critical remarks concerning the filtration theory of hydrophthalmus).** Ann. di ottal. **80**:349-356, 1954.

Three congenital anomalies in adults were examined gonioscopically (two bilateral iris colobomas and one microphthalmus). In two eyes mesodermal embryonal tissue could be seen in the cornea-iris angle. The ocular tension was normal in all eyes. This finding of mesodermal tissue in the angle in the absence of increased tension invalidates the postulate that it is pathognomonic for hydrophthalmus and makes it doubtful that hydrophthalmus is caused by hypersecretion. (13 references) John J. Stern

Weizenblatt, Sprinza. **Congenital malformations of cornea associated with embryonic arrest of ectodermal and mesodermal structures.** A.M.A. Arch. Ophth. **52**:415-425, Sept., 1954.

The clinical and histopathologic findings in two cases are reported. The first case was one of congenital myxofibroma of the cornea. The eye had a collar-button shape with an opaque mass in the cornea. The second case was one of congenital staphyloma with bilateral blindness. In both cases there were signs of developmental arrest in the third month of embryonal life. (14 figures, 4 references)

G. S. Tyner.

20

HYGIENE, SOCIOLOGY, EDUCATION AND HISTORY

Reese, Algernon B. **Frequency of retinoblastoma in the progeny of parents who have survived the disease.** A.M.A. Arch. Ophth. **52**:815-818, Dec., 1954.

From an analysis of data received as answers to a questionnaire in 91 cases of retinoblastoma, the author concludes that there is no reason why healthy parents who have one child with retinoblastoma should not have more children, but that it is very strongly indicated that any survivor of retinoblastoma should have no children. (2 figures, 2 references)

G. S. Tyner.

Snyder, Charles. **First International Congress of Ophthalmology and contemporary state of ophthalmology in America.** A.M.A. Arch. Ophth. **52**:264-271, Aug., 1954.

From the records of this meeting the author presents interesting data. Some of the principal topics were military ophthalmia, trachoma, the recently developed Helmholtz ophthalmoscope, surgery as a treatment for cataracts and the use of palpebral occlusion for corneal ulcers and perforations. (22 references)

G. S. Tyner.

Wilson, Warren A. **Retrolental fibroplasia in Los Angeles County.** Tr. Pacific Coast Oto-Ophth. Soc. **34**:105-113, May, 1953.

The occurrence of retrolental fibroplasia in Los Angeles County and White Memorial Hospitals is briefly surveyed. (3 references) Robert A. Moses.

NEWS ITEMS

Edited by Donald J. Lyle, M.D.
601 Union Trust Building, Cincinnati 2

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notices of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

Deaths

Dr. John Steele Barnes, Albuquerque, New Mexico, died December 8, 1954, aged 87 years.

Dr. Robert Rhodes Chace, New York City, died November 24, 1954, aged 44 years.

Dr. Everett Powers, Carthage, Missouri, died December 16, 1954, aged 85 years.

Dr. David Henry Rhodes, Pittsburgh, Pennsylvania, died October 31, 1954, aged 55 years.

Dr. Hunter Watt Scarlett, Bryn Mawr, Pennsylvania, died December 23, 1954, aged 69 years.

Dr. E. Gerard Smith, Lancaster, Pennsylvania, died November 20, 1954, aged 51 years.

Announcements

Orthoptic examinations

The annual examination of orthoptic technicians by the American Orthoptic Council will be conducted in August and October, 1955.

The written examination will be nonassembled and will take place on Thursday, August 25th, in certain offices and will be proctored by designated ophthalmologists.

The oral and practical examinations will be on Saturday, October 8th, in Chicago just preceding the meeting of the American Academy of Ophthalmology and Otolaryngology.

Application for examination will be received by the office of the secretary of the American Orthoptic Council, Dr. Frank D. Costenbader, 1605 22nd Street, N.W., Washington 8, D.C., and must be accompanied by the examination fee of $30.00. Applications will not be accepted after July 1, 1955.

Home study courses

The 1955-1956 home study courses in the basic sciences related to ophthalmology and otolaryngology, offered as a part of the educational program of the American Academy of Ophthalmology and Otolaryngology, will begin on September 1, 1955, and continue for a period of 10 months. Detailed information and application forms can be obtained from Dr. William L. Benedict, the executive secretary-treasurer of the academy, 100 First Avenue Building, Rochester, Minnesota. Registrations should be completed before August 15, 1955.

Course in slitlamp biomicroscopy and ocular surgery

The Committee on Postgraduate Education of the Montefiore Hospital announces an advanced course in slitlamp biomicroscopy of the living eye combined with additional courses in ocular gonioscopy, indirect ophthalmoscopy, surgery of intraocular foreign bodies, surgery of cataract, and retinal detachment surgery, to be given by the Montefiore Department of Ophthalmology under the direction of Dr. Harvey E. Thorpe and associates. These courses will be given at the Montefiore Hospital, Pittsburgh, for five days, April 25 to 29, 1955, inclusive, from 8:30 a.m. to 4:00 p.m.

The fee for the course is $75.00. A deposit of $25.00 is required for registration.

For further information write to:

A. Krajeck, Secretary of Postgraduate Ophthalmic Courses,
323 Jenkins Building,
Pittsburgh 22, Pennsylvania.

Guest speakers will be Dr. Robert J. Masters, Indianapolis, Indiana; Lee Allen, Iowa City, Iowa.

Vienna seminars

The American Medical Society of Vienna announces a series of seminar congresses in ophthalmology to be presented by the medical faculty of the University of Vienna. The schedule includes:

April 5th to 7th: Histology of the eye; histopathology of the eye; ocular muscle anomalies.

May 3rd to 5th: Refraction, ocular motility, perimetry.

June 7th to 9th: Plastic surgery of the eye; external diseases of the eye, glaucoma.

July 5th to 7th: Slitlamp microscopy, ophthalmology, ocular therapeutics.

August 2nd to 4th: Electrosurgical treatment of the eye, ocular cataracts, retinal detachments.

September 6th to 8th: Operative ophthalmology, gonioscopy, anomalies.

October 4th to 6th: Neuro-ophthalmology, diseases of the retina, physiology of the eye.

November 8th to 10th: Ophthalmic medicine, diagnostic examination, ocular adnexa.

For further information write:

American Medical Society of Vienna
I. Vienna, Universitaetsstrasse 11

Or Cable:

Ammedic, Vienna.

Miscellaneous

Eye symposium at Walter Reed

More than 150 civilian and military eye specialists from many parts of the United States and foreign countries attended a three-day postgraduate course in ophthalmology at Walter Reed Army Medical Center, Washington, D.C.

Faculty members include Dr. Alson E. Braley, Iowa City, Iowa; Dr. Ramon Castroviejo, New

York; Dr. J. S. Friedenwald, Baltimore; Dr. W. F. Hughes, Jr., Chicago; Dr. Frank B. Walsh, Baltimore; Dr. Harold R. Downey, Dr. L. Connor Moss, Dr. G. Victor Simpson, and Dr. Lorenz E. Zimmerman, Washington, D.C.

Also on the staff were Col. J. H. King, Jr., Walter Reed Army Hospital; Col. Charles Leedham, Office of the Army Surgeon General; Col. Austin Lowrey, Jr., Fitzsimons Army Hospital; Col. Karl D. MacMillan, Valley Forge Army Hospital; Col. Francis W. Pruitt, Lt. Col. Joel N. McNair, Lt. Col. Jack W. Passmore, Lt. Col. Charles O. Rixey, and Capt. William C. Owens, Walter Reed Army Hospital.

Brazilian postgraduate course

Under the sponsorship of the Brazilian Society of Ophthalmology, Rio de Janeiro, the second Postgraduate Course in Ophthalmology was held from February 28th to March 26th. Dr. Almiro Azeredo was director of the course and the teachers were:

Professors: Abreu Fialho, Almiro Azeredo, Barbosa Luz, Caldas Brito, Evaldo Campos, Jonas Arruda, Luiz Novais, L. Eurico Ferreira, Marcelo Ferreira, Joviano Rezende, N. Moura Brasil, Pedro Moacyr, Rui Fernades, Rui Rolin, Werter Duque Estrada.

During the first week the curriculum included anatomy, histology, and physiology related to the eye, including laboratory studies; second and third weeks, eye examination and pathology; fourth week, eye surgery.

Masters Award Fund

Establishment of the Robert J. Masters Award Fund in the Indiana University School of Medicine as a recognition of Dr. Masters' contributions to medical education has been announced by his students and friends.

A bronze plaque will be placed in the ophthalmology department where Dr. Masters has served as a member of the staff since 1925, shortly after receiving his M.D. degree from Indiana University.

Dr. Masters,who retired as chairman last year, continues as professor of ophthalmology and maintains his active interest in the department and his practice. Under his leadership the Department of Ophthalmology and its eye clinics attained national recognition in teaching, service, and research. Dr. Masters has also been prominent in a number of professional organizations and has filled a number of important offices including chairmanship of the A.M.A. Section on Ophthalmology.

Dr. Fred M. Wilson, who succeeded Dr. Masters as head of the department, announced that the award fund would be used for the benefit of graduate students in the ophthalmology department, as recognition of unusual excellence and achievement.

SOCIETIES

Pennsylvania meeting

On the ophthalmology program at the meeting of the Southwestern Pennsylvania Chapter of the American College of Surgeons held recently at Pittsburgh:

Dr. John C. Dunbar, Dr. C. William Weisser, Dr. Robert F. Rohm, Dr. Abraam Steinberg, and Dr. Jay G. Linn, Jr., participated in a symposium on the "Surgical treatment of glaucoma." Dr. Byron C. Smith, New York, discussed the "Management of traumatic lesions about the eye and orbit."

NSPB meeting

The 1955 conference of the National Society for the Prevention of Blindness was held recently in New York. The theme of the program for the first session was "Community attack on blindness," with Dr. Ira V. Hiscock, Yale University, serving as chairman. The following papers were presented:

"Responsibility of the ophthalmologist," Dr. William L. Benedict, Rochester, Minnesota; "Role of the public health worker," Dr. Warren Palmer Dearing, Public Health Service, Washington, D.C.; "Use of mass media to inform the public," Donald D. Hoover, New York; "Industrial aspects of prevention of blindness," Dr. Leonard Greenburg, New York.

Dr. Hedwig S. Kuhn, Hammond, Indiana, was chairman for the session discussing, "Advances in industrial vision conservation." The speakers were:

"Saving sight on a multi-plant basis," Dr. Russell DeReamer, New York; "Dividends from discipline," Dr. W. J. Niederauer, New York; "Seeing and safe driving," Dr. Leon Brody, New York; "The importance of medical-saftey teamwork," Dr. L. C. Hatch, Akron, Ohio.

Acting as chairman of the session discussing "Progress in education of the partially seeing child," Mrs. Hazel C. McIntire, Ohio State Department of Education, Columbus, introduced the following speakers:

"Some problems in administering educational facilities for partially seeing children," Mrs. Claire Burrell, New York; "Aids for children with subnormal vision," Howard F. Haines, Ohio State University, Columbus, and Dr. Gerald E. Fonda, Short Hills, New Jersey.

Miss Cora L. Shaw, New York, was chairman of the panel discussing, "Opportunities for nurses to conserve the sight of the whole family." Speakers on the panel were: "Earliest beginnings up to the school-age child," Barbara J. Rosencrans, New York; "The school eye-health program," Antoinette E. Colasurda, New York; "The vocational school and the industrial eye-health program," Margaret S. Hargreaves, New York; "The older age group and the public-health approach to special problems," Esther L. Martinson, Montpelier. Discussors were: Mrs. William K. Brown, Denver; Norine Oddou, Fort Wayne, Indiana; Louise G. Sexton, Concord, New Hampshire.

Dr. H. Robert Blank, New York, spoke on the "Psychoanalytic considerations for professional workers in the prevention of blindness."

At the session discussing "Progress in research in blindness prevention," Dr. William L. Benedict, Rochester, Minnesota, acted as chairman. The

speakers were: "Status of retrolental fibroplasia," Dr. Jonathan T. Lanman, New York; "Studies in uveitis," Dr. Ralph W. Ryan, Bethesda, Maryland; "New drugs," Dr. Irving H. Leopold, Philadelphia; "Plastic replacement of the cornea," Dr. William Stone, Jr., Boston.

At the final session, Edward J. Hughes and Frank Seitz, White Plains, New York, spoke on "Communicating eye-health information to the public."

Los Angeles officers

The Los Angeles Society of Ophthalmology and Otolaryngology has elected the following officers:

President, Dr. Robert A. Norene; secretary-treasurer, Dr. Leland R. House; chairman and secretary of the Section on Ophthalmology, Dr. Wendell C. Irvine; and Dr. Stephen J. Popovich; chairman and secretary of the Section on Otolaryngology, Dr. Herschel H. Burston and Dr. Ross A. Goodsell. The Section on Otolaryngology meets the fourth Monday of each month from September through June; the Section on Ophthalmology, the first Thursday of each month from September through June, at the Los Angeles County Medical Association Building, 1925 Wilshire Boulevard.

Eastern Research section

At the meeting of the Eastern Section, Association for Research in Ophthalmology, held in Boston on Monday, April 25th, the following papers were read:

"Further studies on corneal lipogenesis," Dr. David G. Cogan and Dr. Toichiro Kuwabara; "Electromyogram of extraocular muscles in the human," Dr. Alfred J. Magee; "Formation of the vitreous body," Dr. Endre A. Balazs; "An investigation of Descemet's membrane: (a) Biochemical studies, Dr. Endre A. Balazs, (b) Fine structure," Dr. Marie A. Jakus; "Studies on *B subtilis* and related organisms as eye pathogens," Dr. William Reiner-Deutsch, Dr. Gerald Kara, and Dr. Hunter H. Romaine; "The effects of succinylcholine on intraocular pressure," Dr. Harvey A. Lincoff; "The present status of the plastic artificial cornea," Dr. William Stone, Jr.; "Experimental tonography in rabbits," Dr. Walter Kornblueth and Dr. Eric Linner; "Clinical electroretinography (film)," Dr. Jerry H. Jacobson.

Midwest Research section

The Midwest Section of the Association for Research in Ophthalmology meeting on Saturday, April 30th, at the Mayo Clinic, Rochester, Minnesota, heard the following speakers:

Dr. Walter H. Fink, "The nonstriated muscle of the human orbit"; Dr. A. C. Hilding, "Some aspects of the healing of the posterior surface of the cornea following cataract surgery"; Dr. A. H. Riesen, "Early developments of fixation responses as related to the visual environment"; Dr. Christopher H. Moore, "Effects of ultrasound upon certain structures of the eye"; Dr. H. A. Swanljung and Dr. Frederick C. Blodi, "Tonography in provocative tests for glaucoma"; Dr. A. K. Hansen and Dr. H. A. Swanljung, "Observations on the investigation of anomalous retinal correspondence"; Lee Allen and Dr. Hermann M. Burian, "New concepts of the development of the angle of the anterior chamber: Studies of its embryology and comparative anatomy"; Dr. B. Schwartz and Dr. P. J. Leinfelder, "The effect of change in pH on lens metabolism"; Dr. E. A. Auerbach and Dr. Hermann M. Burian, "Electroretinographic evidence for the scotopic curve during the photopic phase of dark adaptation."

Oxford meeting

The 40th annual meeting of the Oxford Ophthalmological Congress will assemble at Balliol College, Broad Street, Oxford, on Monday evening, June 27th, and meetings will be held on June 28th, 29th, and 30th. The Doyne Memorial Lecture will be delivered by Mr. Tudor Thomas, Cardiff, on Wednesday morning, June 29th. Ophthalmologists who wish to attend the meetings should write for further information to:

Mr. Ian C. Fraser
21 Dogpole
Shrewsbury, England

Personals

At a special meeting held in the main auditorium of the Paulista Medical Association on February 12th, Dr. Moacyr E. Alvaro was awarded the Gold Medal of the Centro de Estudos de Ophthalmologia for his contribution toward the progress of Brazilian ophthalmology. After receiving the medal, Dr. Alvaro delivered the Centro de Estudos de Ophthalmologia lecture on "Recent trends in organized ophthalmology."

Dr. Lawrence T. Post, Saint Louis, has been elected to honorary membership in the National Society for the Prevention of Blindness. Dr. Post, a consultant to NSPB since 1932, has served on the board of directors, the research committee, and the glaucoma committee.

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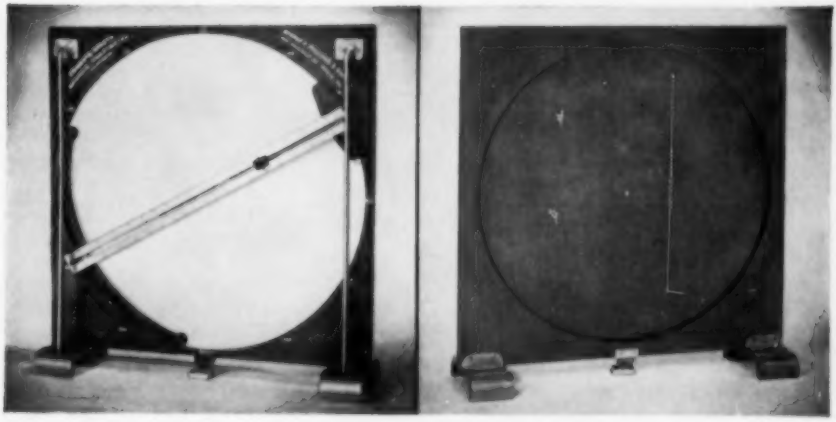


*Conover-Spaeth**

MAGNETIC CAMPIMETER

***EDMUND B. SPAETH, M.D.**

PHILADELPHIA, PA.

This new precision instrument gives *accurate* determinations and correct configuration of the visual field with great savings of time and effort.

The Conover-Spaeth Campimeter is 24" square. It is placed on a table with the patient seated in front, his eye positioned 10½" from the central fixation point. The operator, standing behind the screen, facing the patient and looking directly into the patient's eye, is able to detect the slightest wavering. The test object is introduced to the visual field from a "Concealment Circle" and is controlled by a magnet from the back of the campimeter. The patient is not able to anticipate or even guess on which radius or from which side, right or left, the test object will appear.

This assures accuracy and eliminates time-consuming rechecking.

The back of the campimeter is clearly marked in degrees of the circle and angles of vision to conform to the standard Berens chart. Each radius tested is immediately entered on the chart . . . No markers to be placed or removed.

The time saved in each examination creates opportunities for more "fields" or other office work.

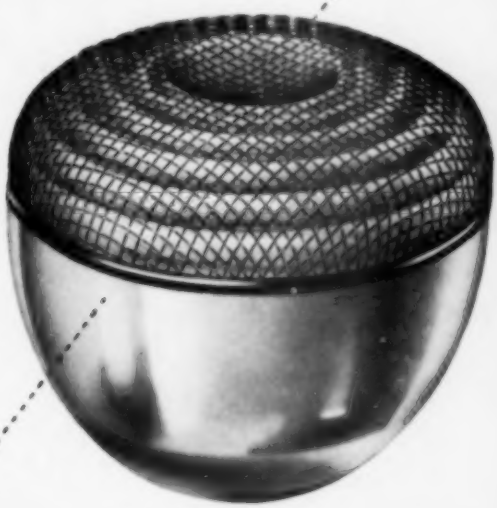
√ ABSOLUTE ACCURACY

√ FAR FASTER

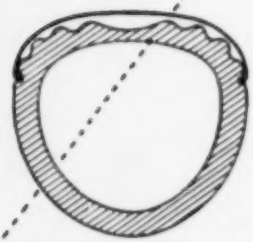
Write for detailed information.

AO MONOPLEX† MESHED CAPPED HOLLOW BURIED IMPLANT

by
G. BONACCOLTO, M.D.*



HOLLOW PLASTIC GREATLY REDUCES WEIGHT



Cross section showing hollow construction and stainless steel mesh.

Materials are inert stainless steel mesh (to which muscles are attached) over a hollow methyl methacrylate body.

SIZES: Small (16.5 mm.); Medium (18.0 mm.); and Large (19.5 mm.). Available through your nearest American Optical Company office.

Operative procedure by Dr. Bonaccolto available by writing to: American Optical Co., Monoplex Department, Southbridge, Mass.

**This implant and operative procedure was first presented at the International Congress of Ophthalmology in New York in September, 1954.*

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†T.M. Reg. by American Optical Company